World Petroleum

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JUNE, 1950

At Home or Abroad

REGIE AUTONOME DES PETROLES

In Boussens, France or Carthage, Texas, HUDSON-designed plants justify the world-wide reputation of Hudson Engineering Corporation as leaders in the field of gas processing.

THE CARTHAGE CORPORATION

Pictured above are two HUDSON-designed plants . . . each processing gas to extract propane and heavier hydrocarbons and water vapor from gas entering cross-country pipe lines. The Carthage Corporation plant, largest of its kind in the United States, is installed at Carthage in East Texas. The French plant, owned and operated by Regie Autonome des Petroles, processes gas from the St. Marcet gas-distillate field, in the foothills of the Pyrennes mountains. This is the largest gas processing plant in Europe.

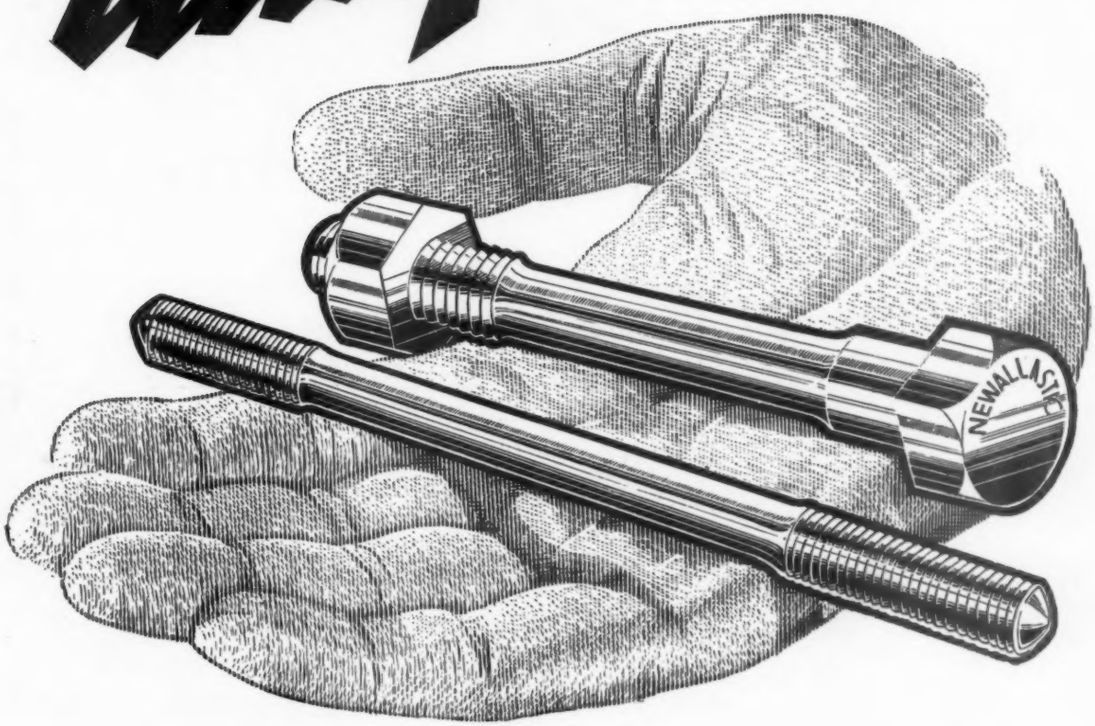
HUDSON

ENGINEERING CORPORATION

FAIRVIEW STATION HOUSTON, TEXAS

GAS COMPRESSOR STATIONS • CYCLING PLANTS • GAS DEHYDRATION PLANTS • NATURAL GASOLINE PLANTS • FRACTIONATION UNITS • CRUDE TOPPING UNITS • PRESSURE MAINTENANCE PLANTS • HYDROGEN SULPHIDE REMOVAL PLANTS • ATMOSPHERIC AND VACUUM DISTILLATION UNITS

Unique

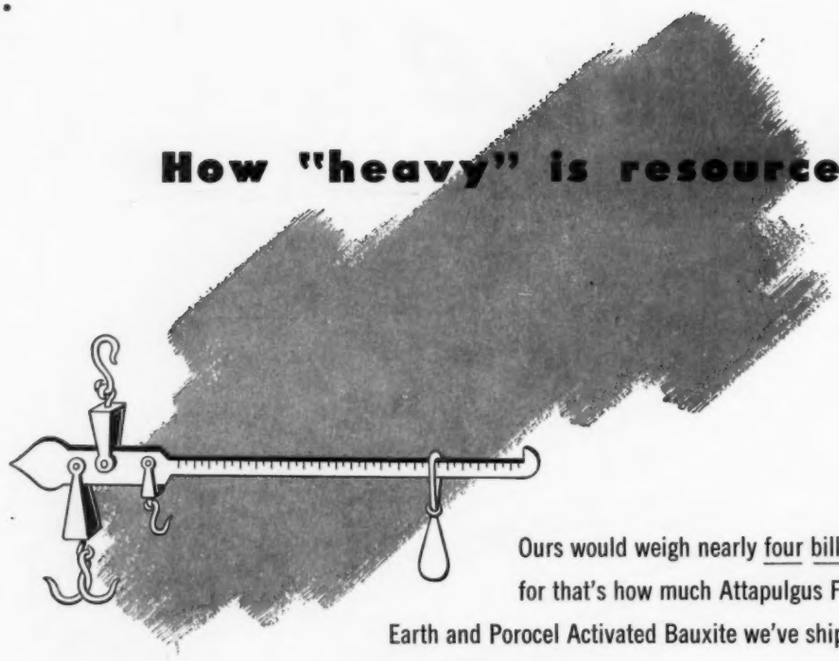


"Newallastic" bolts and studs have qualities which are absolutely unique. They have been tested by every known device, and have been proved to be stronger and more resistant to fatigue than bolts or studs made by the usual method.

C. P. Newall & Co., Ltd.

POSSILPARK GLASGOW · N

How "heavy" is resourcefulness?



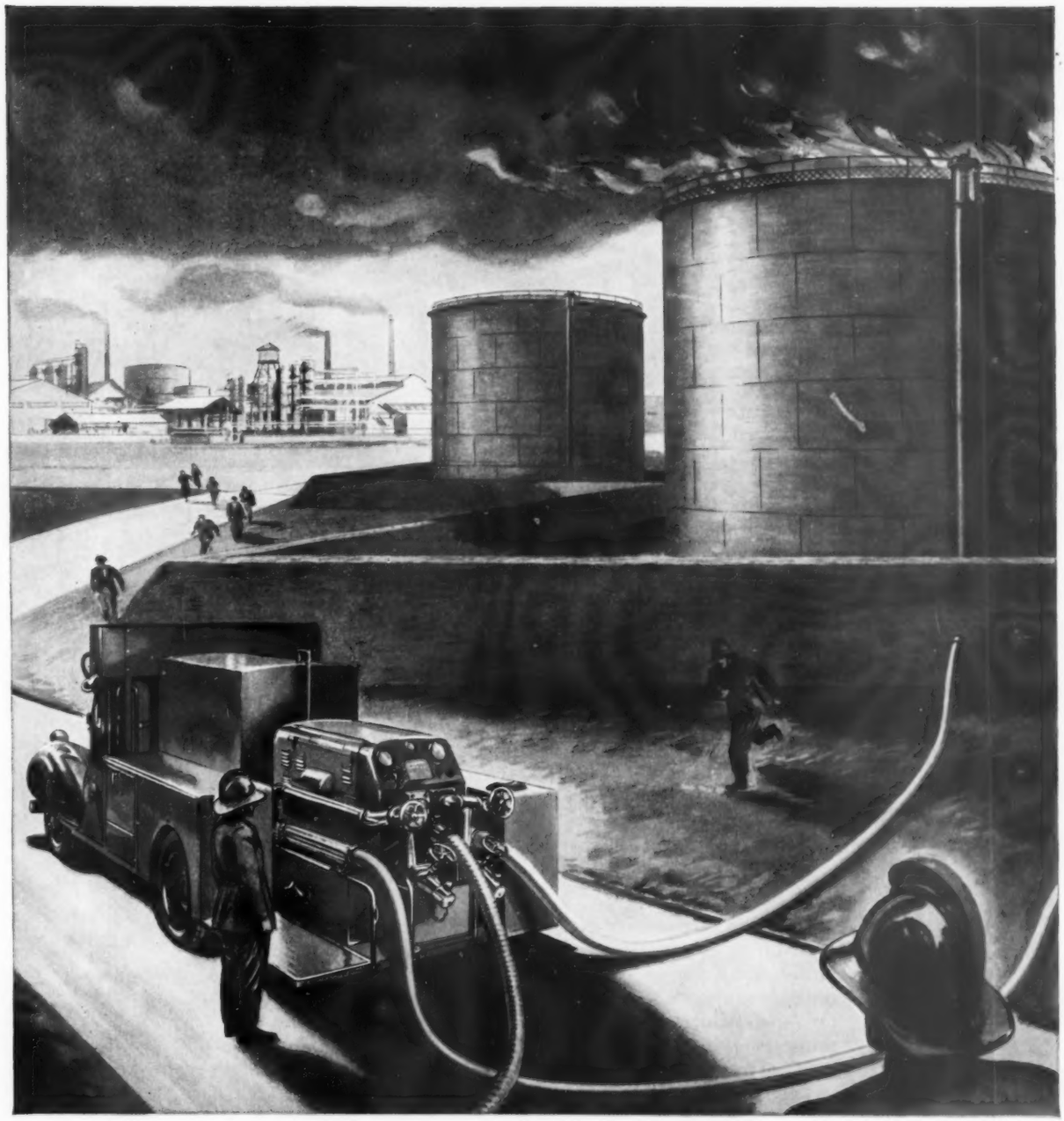
Ours would weigh nearly four billion pounds, for that's how much Attapulgus Fullers Earth and Porocel Activated Bauxite we've shipped to petroleum refiners.

When weighing resourcefulness—as it applies to percolation adsorbents and solid catalysts—two factors are particularly meaningful: First, the desire of all the people in the company family to tackle problems that require particular skill and broad technical knowledge. Second, the company's physical reach—mines, plant equipment, specialized laboratory and engineering facilities—for good men can do no more than their tools permit.

These resources abound at Attapulgus and Porocel. They dovetail to put a firm base under a completely integrated service. And—for world-wide petroleum refining—to put the right adsorbents to work under the right conditions.
May we be of service to you?

ATTAPULGUS CLAY COMPANY *Fullers Earth* · **POROCEL** CORPORATION *Activated Bauxites*

Dept. X; 210 West Washington Square, Philadelphia 5, Pa.



Modern—Scientific FIRE PROTECTION FOR OIL STORAGE TANKS

The highly specialised fire protection essential to the safety of bulk storage of oils and spirits is provided within the wide range of "PYRENE" Fire Fighting Equipment. The latest combination of fire appliances for the protection of new or existing tank installations is illustrated above. This comprises a "PYRENE" Mechanical Foam Tender operating in conjunction with fixed foam risers carried through the bund to a foam hose coupling. The tender carries 500 gallons of "PYRENE" Foam Compound, two "PYRENE" Mechanical Foam Generators and six 50-lb. cylinders of CO_2 gas with two CO_2 hose reels and gas distributor horns. It is equipped with an independent fire pump of 350/500 g.p.m. capacity. Water is obtained from either a hydrant or static supply. Its total output is 90,000 gallons of foam and 2,400 cubic ft. of CO_2 gas without replenishment. As an alternative to the above protection there are various forms of fixed "PYRENE" Foam Installations and portable Telescopic Foam Towers. Full details and specifications will be forwarded on request.

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Cables: "PYRENE, LONDON" Associated with The Pyrene Manufacturing Co. of America.

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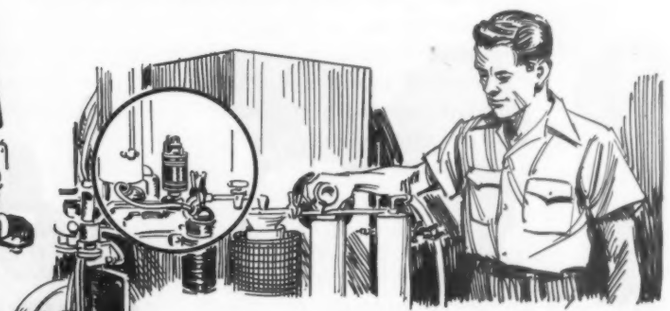
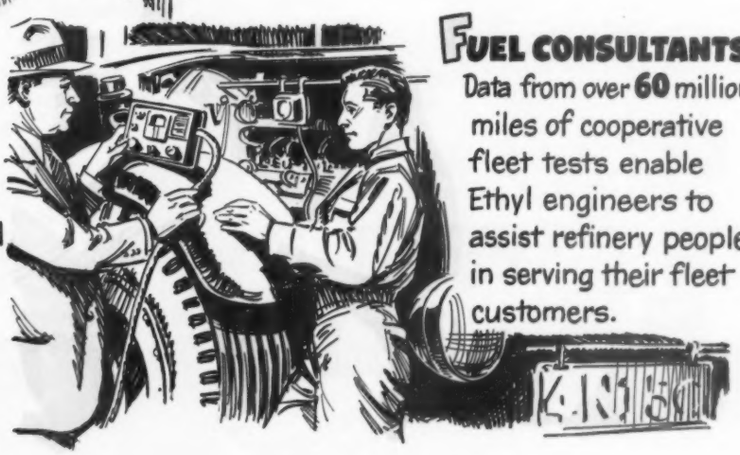
Speaking of Research... by ETHYL

THIS AUTOMATIC FOOT controls the throttle on an engine being used to evaluate experimental antiknock compounds.



QUICKER THAN A WINK. In basic research to solve the mysteries of combustion, Ethyl uses a special valve which takes a fuel-air sample from the engine cylinder in **1/1000** of a second.

SCREEN TEST. To continually check the purity of pig lead and metallic sodium which are used in the manufacture of tetraethyllead spectrograms are observed with a densitometer.



FUEL CONSULTANTS. Data from over **60** million miles of cooperative fleet tests enable Ethyl engineers to assist refinery people in serving their fleet customers.

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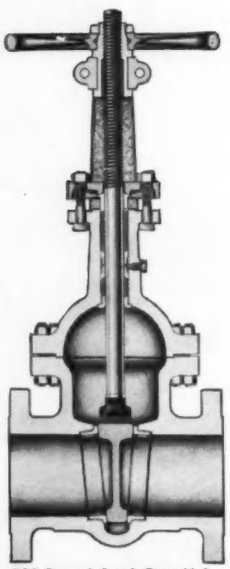
Why shop around for piping materials?

CRANE has everything you need



300-Pound Steel Gate Valve furnished trimmed for oil and oil vapor up to 1100° F.; or steam or water up to 1000° F. Sizes 1½ to 24-inch.

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You can always rely on sturdy Crane Cast Steel Gate Valves. Tight closure is assured by long, close fitting guides that seat the solid wedge disc accurately against screwed-in body seat rings. This guiding action minimizes disc drag, reduces wear on seating surfaces. Minimum resistance to flow is assured by straight-through ports.

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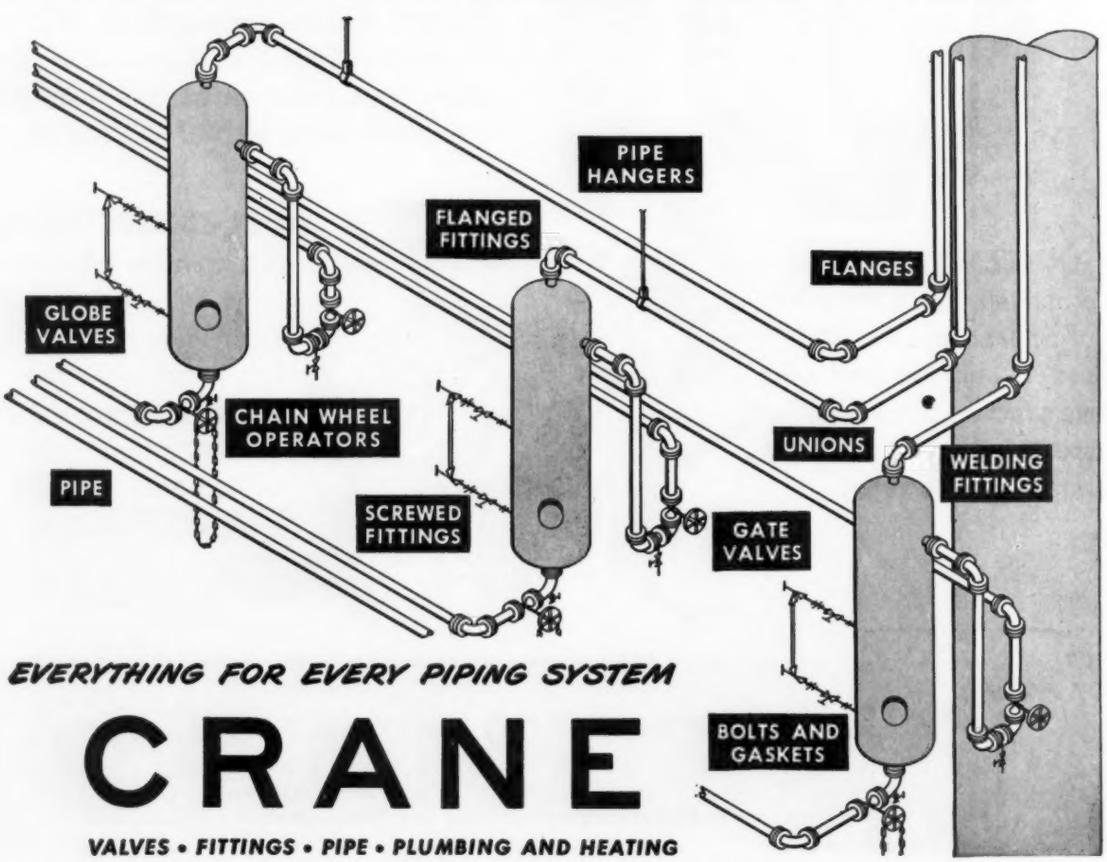

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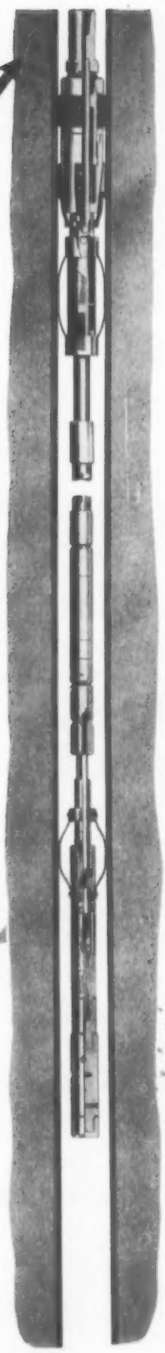

The Symbol of Two of the Greatest Advancements in Oil Field Technique

The JOHNSTON FORMATION TESTER and the "SHOOT-N-TEST" GUN PERFORATOR provide operators throughout the world with accurate, safe, dependable means for efficiently and economically developing their drilling programs.

THE JOHNSTON FORMATION TESTER Determines the productivity possibilities of sands encountered in drilling wells as they are penetrated without the expense of setting casing.

THE "SHOOT-N-TEST" GUN PERFORATOR Has the versatility to be used solely as a casing perforator or as the perforating unit in combined perforation and test operations.

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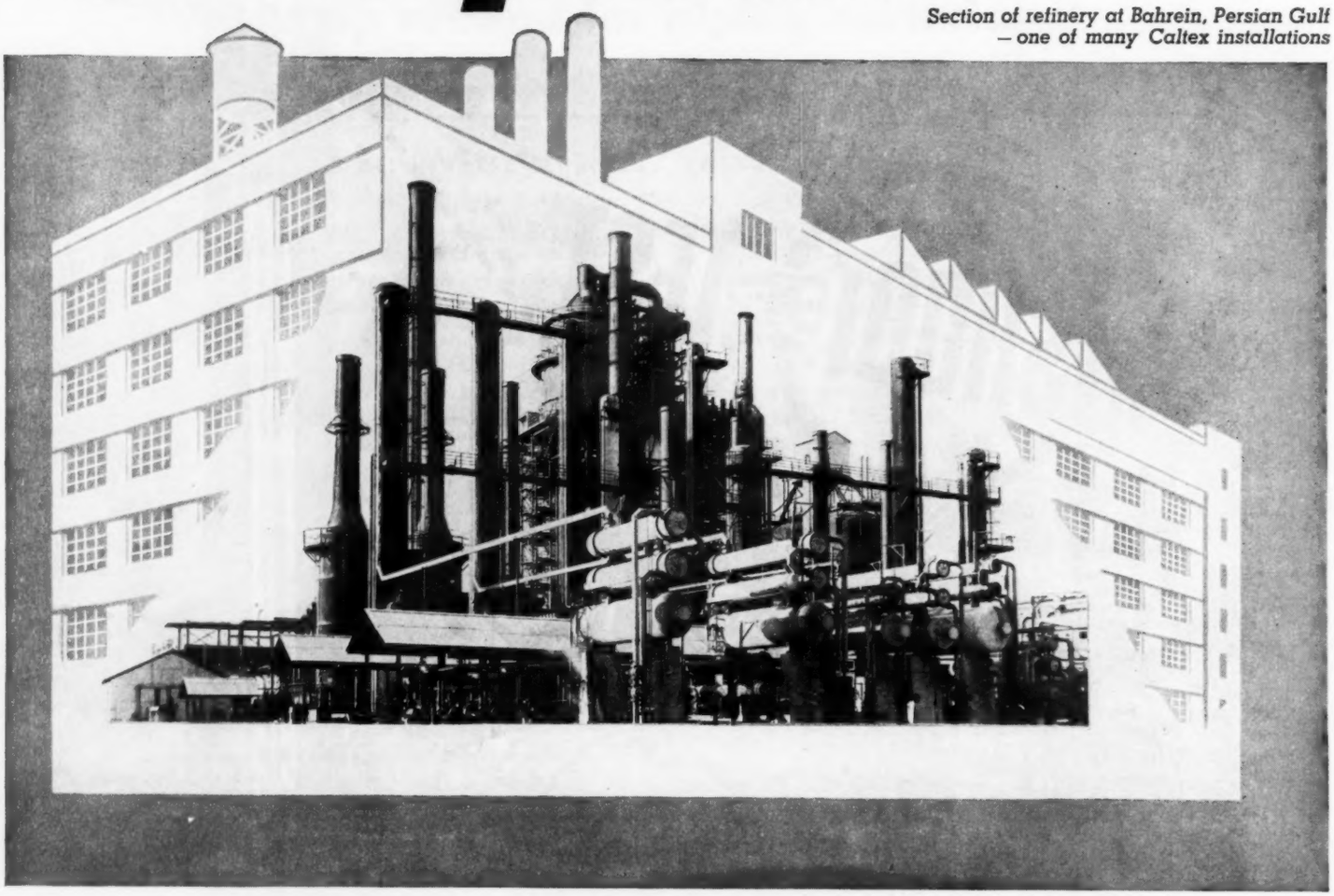
Oil is *power*...

Section of refinery at Bahrein, Persian Gulf — one of many Caltex installations



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REFLECTING the efficiency with which they are produced and refined, Caltex high quality petroleum products insure greater efficiency and economy in the production of industry.

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Released from the production of War material many far-seeing Engineering Firms have joined in the race to meet the urgent call of Oil producers

The land is cleared

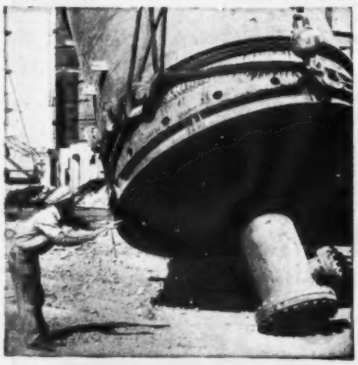
The site is chosen

for Plant and yet more Plant. In this country, Harveys of London have thrown in all their vast resources of men, material and "know how"

A railway is built

A column arrives

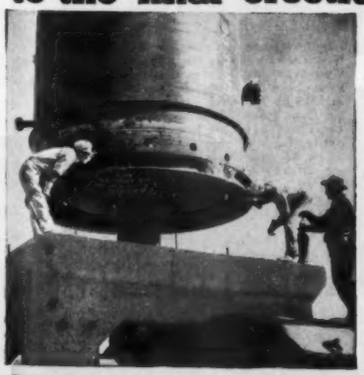
and have so geared production that they are meeting this huge demand with ever-increasing results which will bring benefit to millions.



Off loaded on site

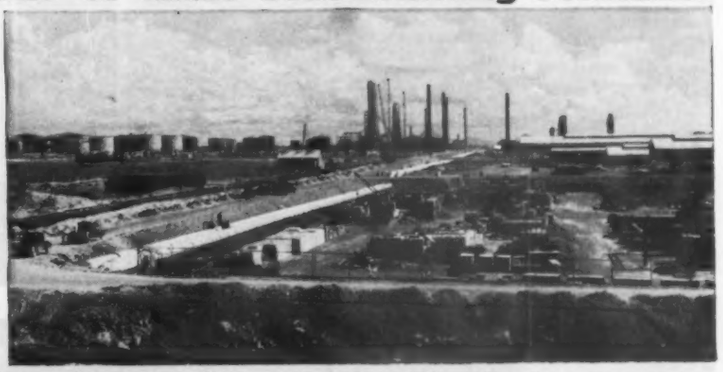
It is gently raised

And so we see, stage by stage, from the clearing of virgin land to the final erection, a history of one of these Fractionating Columns.



and lowered into position

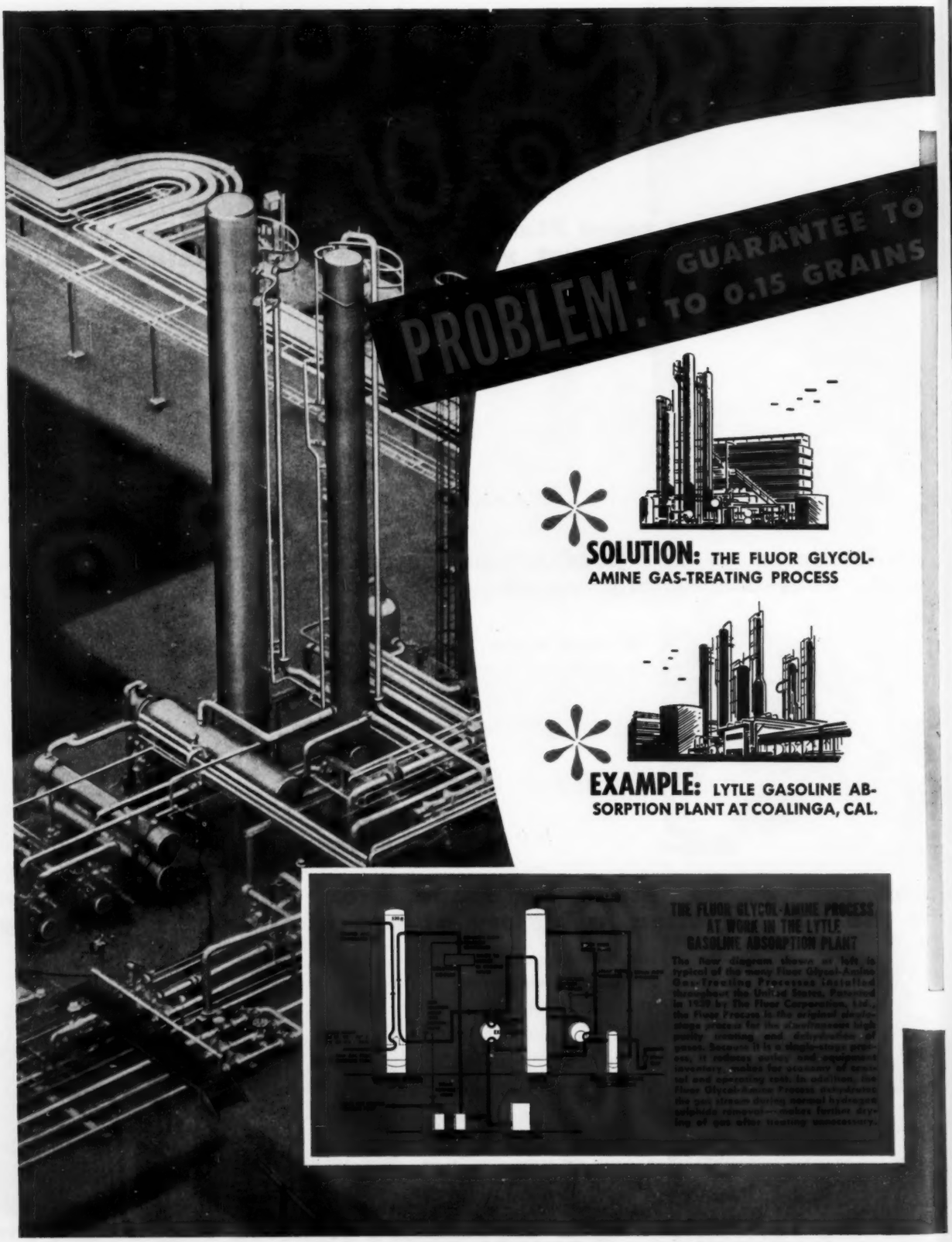
to start immediate production



Necessarily, this pictorial explanation is much condensed, but even so, it clearly evidences another triumph of British Engineering enterprise.

From the Shell Library come these scenes from various stages in the production and transport of one of these huge Fractionating columns.

G.A. Harvey & Co. Harvey (London) Ltd. Woolwich Road, London, S.E.7


PROBLEM: GUARANTEE TO TO 0.15 GRAINS
SOLUTION: THE FLUOR GLYCOL-AMINE GAS-TREATING PROCESS
EXAMPLE: LYTLE GASOLINE ABSORPTION PLANT AT COALINGA, CAL.
THE FLUOR GLYCOL-AMINE PROCESS AT WORK IN THE LYTLE GASOLINE ABSORPTION PLANT

The Lytle Gasoline Absorption Plant at Coalinga, California, is a story of the Fluor Glycol-Amine Gas-Treating Process at work.

Expansion of natural gas supply through deeper drilling introduced into the Lytle Plant a natural gas so high in hydrogen sulphide content that it was no longer acceptable as commercial sales gas. After processing for gasoline recovery, the discharge gas was analyzed and found to contain 1.25 grains of hydrogen sulphide per 100 SCF and up to three-fourths of 1 mol per cent of carbon dioxide. Even though this gas was sufficiently pure for sale in many areas, in this particular instance requirements for commercial gas were set to *not more than 0.15 grains of hydrogen sulphide per 100 SCF...* a purity requirement so stringent that it would only be attempted by Fluor Gas Processing Engineers using the Fluor Glycol-Amine Gas-Treating Process.

Following study of the requirement by Fluor, a Research Department pilot plant was set to run at gas composition and operating conditions simulating those at the Lytle Plant. Here it was *proved* the Fluor Glycol-Amine Gas-Treating Process could meet—*and exceed by a comfortable operating margin*—the 0.15 grain per 100 SCF requirement efficiently, economically, and on a guaranteed basis.

The plant for the Lytle job was then designed on the findings of the Fluor Research Department. Engineering was set in motion, and a field construction schedule formulated.

The Lytle unit is a "sweet"-running unit paralleling laboratory and pilot plant findings—meeting its guaranteed performance with an adequate margin. This new installation raises the total installed capacity of Fluor Glycol-Amine Gas-Treating Plants to 585,000,000 SCF/D.

Fluor invites owners and operators of gas-producing properties to submit their gas-treating problems for study and recommendation by Fluor's Gas Processing and Research Engineers. Let them study *your* particular problem—the range of purity obtained through use of the Fluor Glycol-Amine Gas-Treating Process is virtually unlimited. It may be the low-cost answer to your gas-treating problem.

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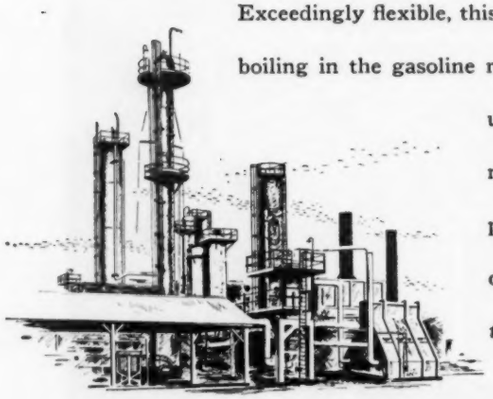

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LABORATORIES: RIVERSIDE, ILLINOIS

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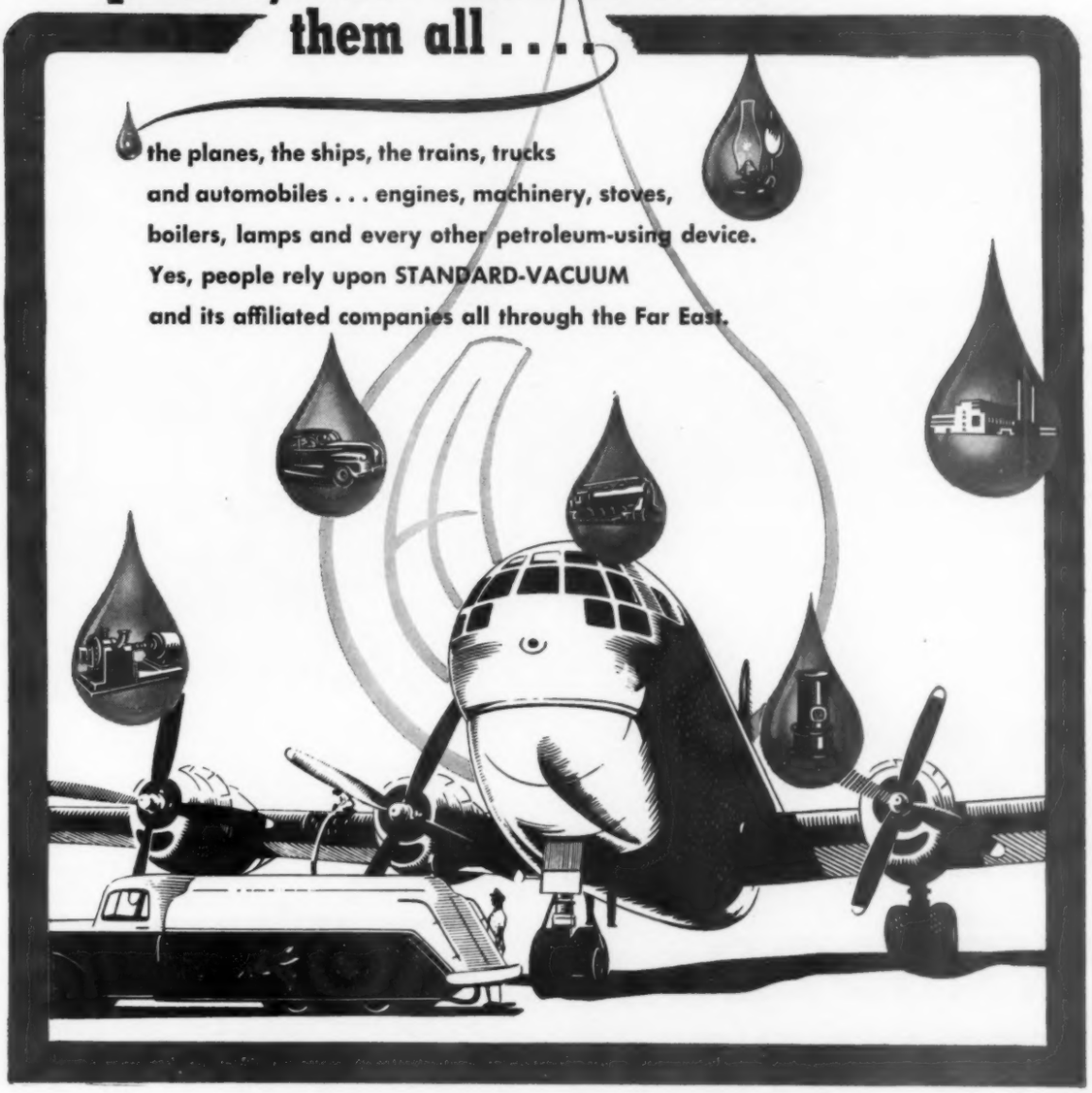
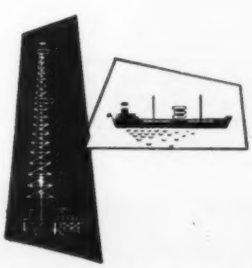

the planes, the ships, the trains, trucks
and automobiles . . . engines, machinery, stoves,
boilers, lamps and every other petroleum-using device.
Yes, people rely upon STANDARD-VACUUM
and its affiliated companies all through the Far East.



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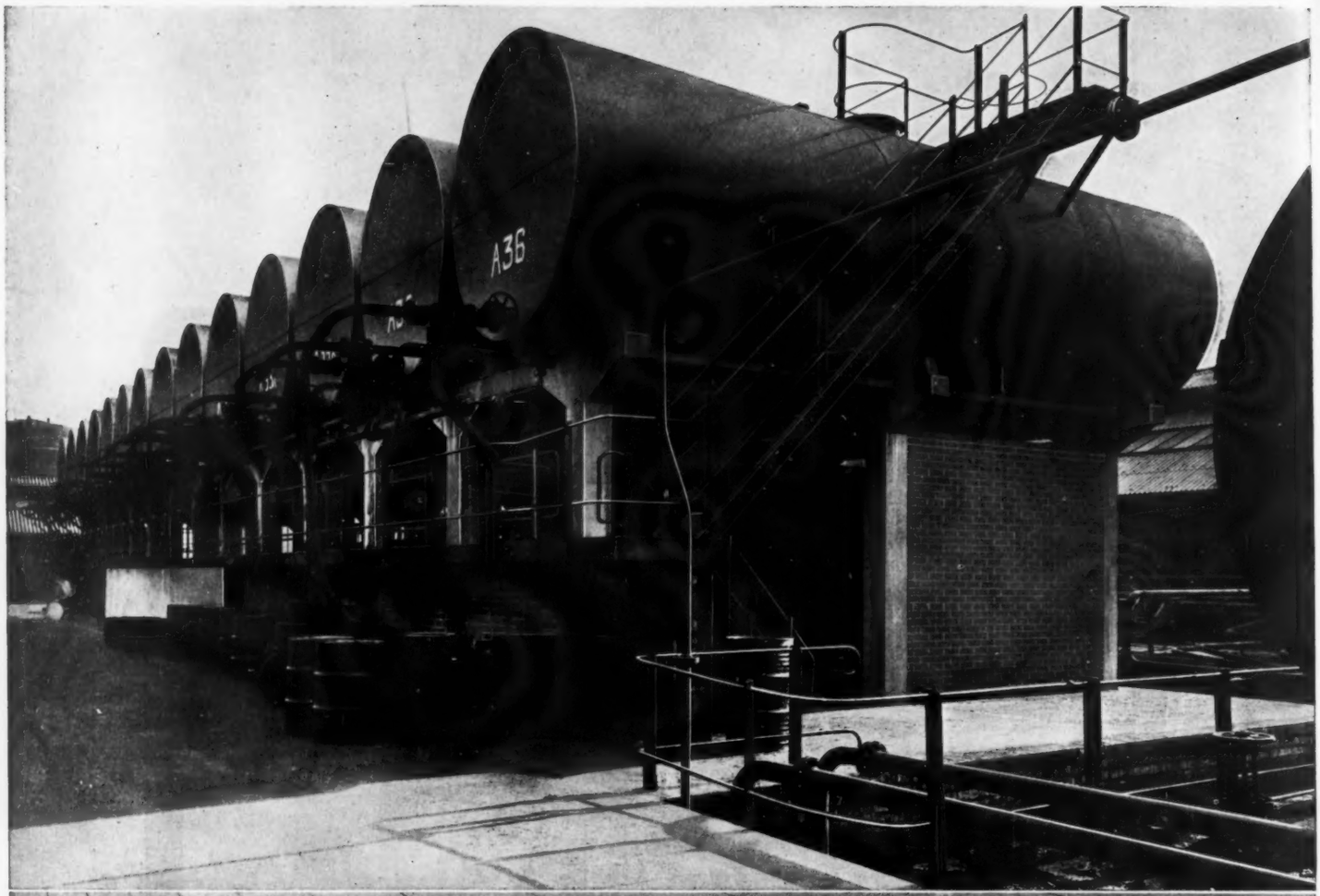

OXLEY

WELDED STORAGE TANKS

A close-up view of a battery of fourteen welded storage tanks each 9′0″ diameter by 30′0″ long with connecting platforms and access staircases. Erected and installed by Oxley at Ellesmere Port, Cheshire, England, for Lobitos Oilfields Ltd., who gave permission for this photograph to be taken.

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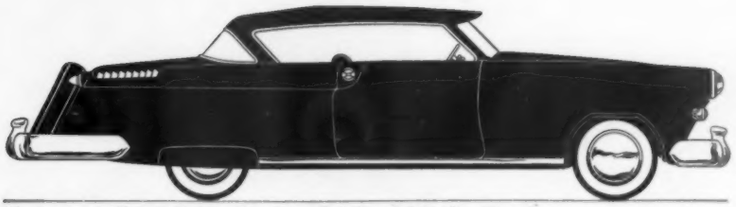

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& Found Wherever Fine Cars Travel

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Every Model Heavy-Duty Engineered to Save You Money

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The men who conducted the International test program have devoted years to development of better truck transportation. They have proved International performance on every type of road, under every type of load, in every type of climate. That means the new Internationals have been tested to answer your transport demands.

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The roomiest cab on the road. Easy-riding cushions that are wide, adjustable . . . giant one-piece Sweepsight windshield . . . controlled ventilation . . . convenient, two-cluster instrument panel. You'll find all these features in every International *plus* Super-steering that is right for position and positive control.

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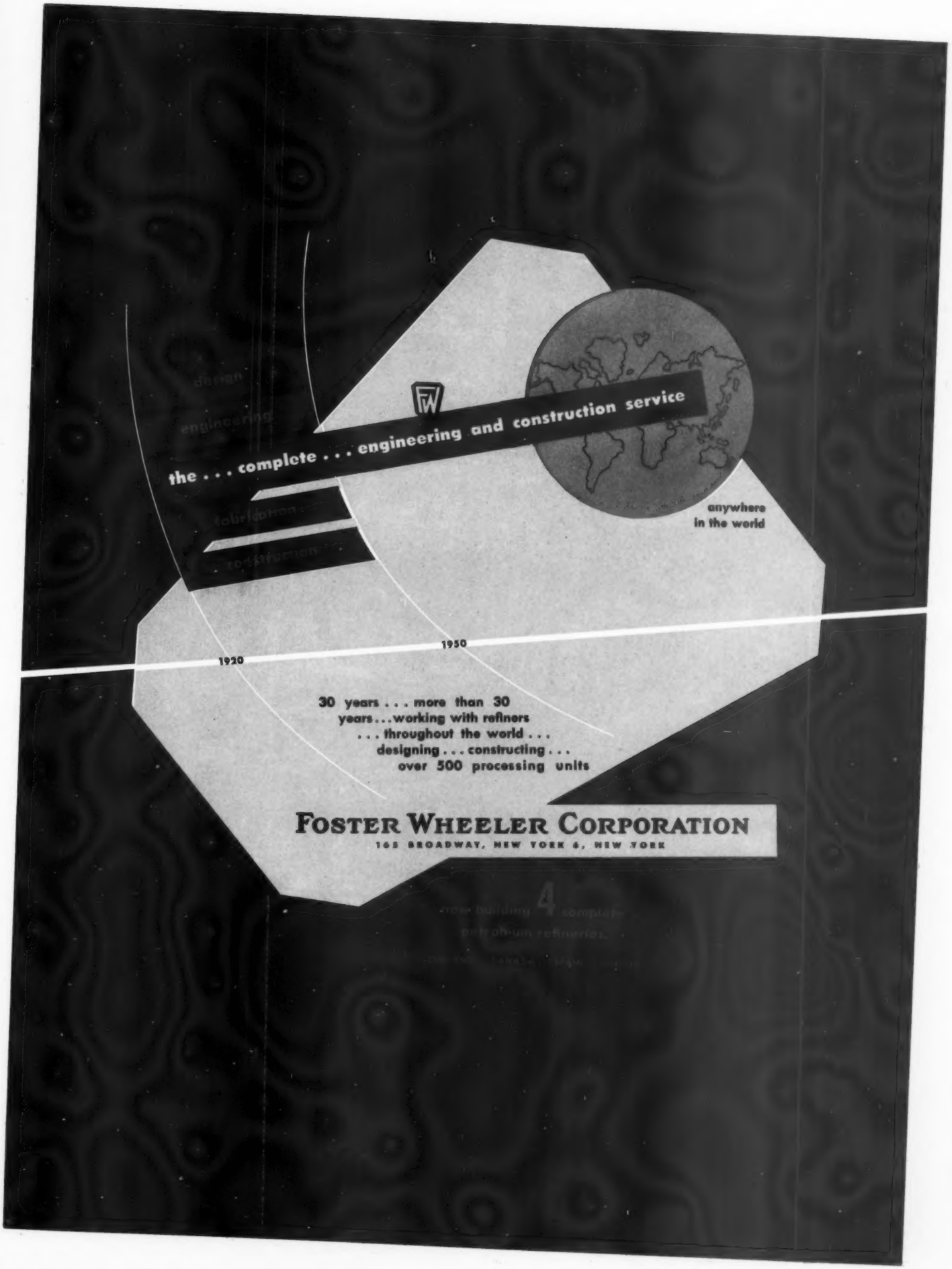
INTERNATIONAL TRUCKS

Better Living through Better Roads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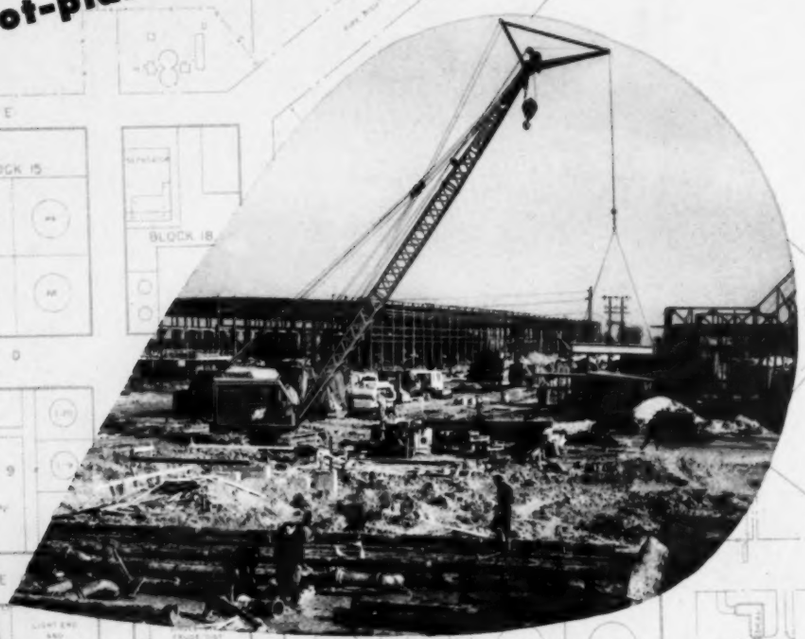
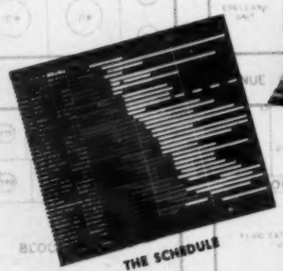
the plot-plan comes alive





THE SCHEDULE

the schedule—the plot-plan—the thousands of details involved in both...labor...materials...transportation...and, of course, the weather...but when all are coordinated by experienced planners and constructors—then, gradually and "on time,"—the big refinery takes shape.

This New Esso Refinery of the Anglo-American Oil Company at Fawley, England, now being built by Foster Wheeler, is scheduled for operation early in 1952. It will be the largest refinery in Europe, with a crude charge capacity of 110,000 bbl day.

NEW ESSO REFINERY
FAWLEY, ENGLAND

FOSTER WHEELER CORPORATION

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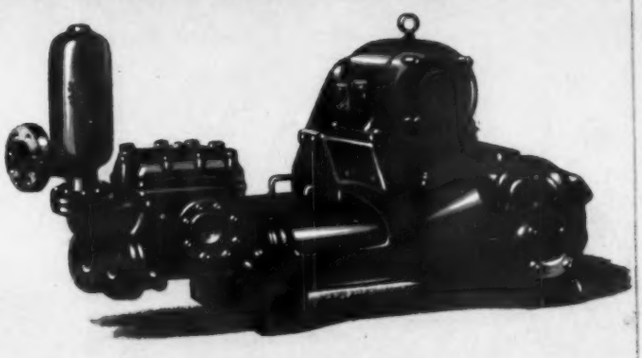
PUMPS

for the Oil Industry



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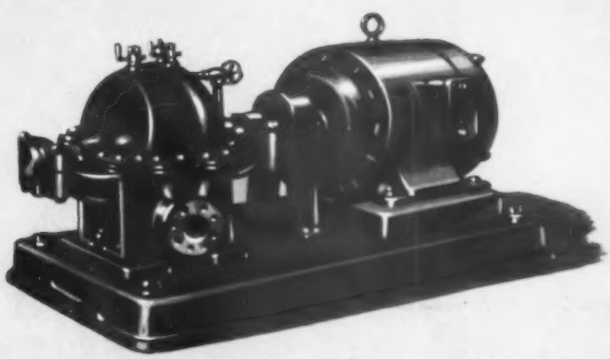

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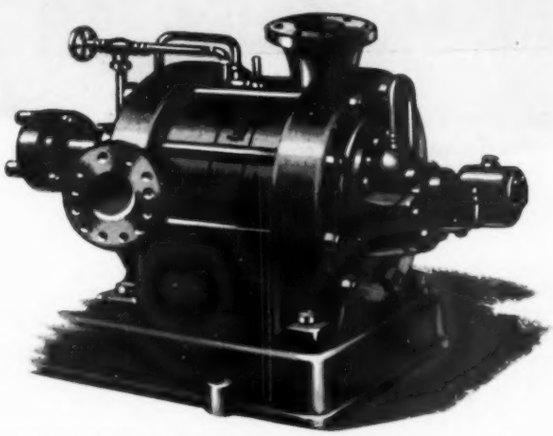

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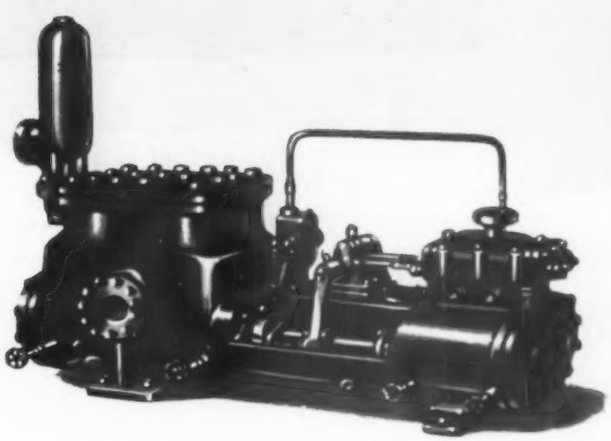

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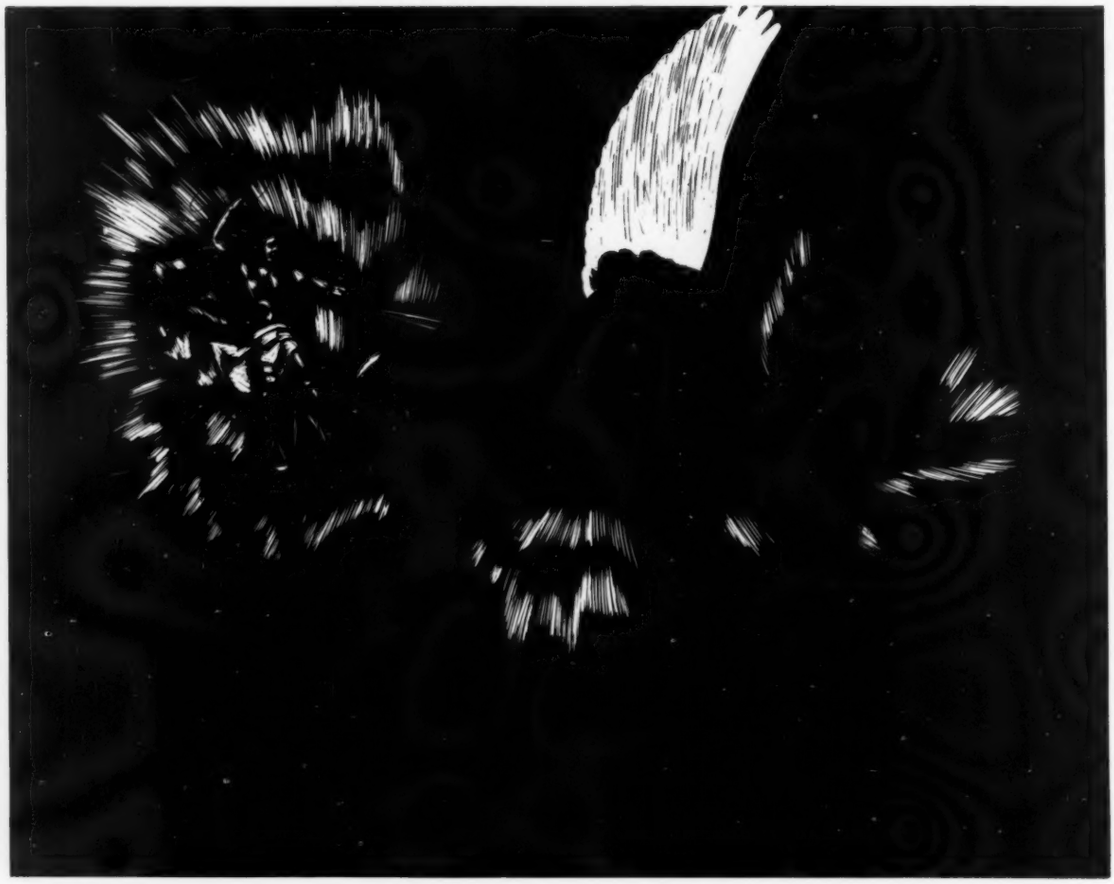

It was obvious, from the earliest times, that some or all heavenly bodies had motion. However, most early men believed that the earth stood still and the sun, moon and stars moved. Classical mythology told that Apollo, the sun god, lived far away in the palace of the sun, with Aurora the goddess of dawn. Each morning he drove the sun from the east to west in a chariot drawn by fiery steeds. In the evening he would return to his eastern home through a subterranean passage under the earth.

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THIS MONTH'S COVER

This month's cover reproduces a 30 by 40-inch oil painting of the fluid catalytic cracking unit installed at Carter Oil Company's Billings, Mont., refinery. The scene was painted by Harold Bordelon during construction of the 20,000 barrel Carter plant which was engineered and built by The Fluor Corp., Los Angeles.

The artist has just been appointed supervisor of advertising for Fluor after serving as assistant for several years. Mr. Bordelon's hobby is painting and illustrating and he hopes to record much of American industry on canvas. He now is working on a series of 12 Indian subjects for calendars. Reproductions of these are being used in Los Angeles area schools for reference.

Impressed by his work Norman Rockwell introduced Mr. Bordelon to Clyde Forsythe, a famous California painter and illustrator who has taken the advertising man under his wing.

Color plates used on the cover are reproduced through the courtesy of The Flour Corp.

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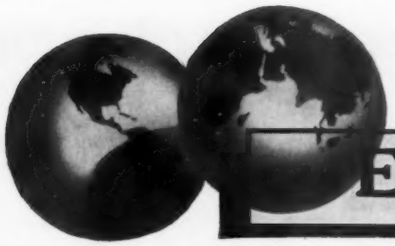

Editorial

Intra-Industry Competition In Hydrocarbons

WHEN the oil industry of the United States some two years ago set about learning how it was regarded by the general public, the inquiry produced some unexpected results. One of the most surprising of these was that a relatively large segment of the population, whose only relationship to the industry was that of consumers of its products, held the opinion that the oil business was essentially monopolistic, or at least that it was dominated by a few large companies.

Even where this impression prevailed, it apparently was not a matter of serious concern, because most of those who gave expression to it agreed that the service rendered by the industry was highly efficient and that its products were reasonably priced. Probably the notion of an actual if intangible "oil trust" was the subconscious effect of political propaganda or a heritage from the time, more than a generation ago, when one large organization actually overshadowed the then much smaller field. Nevertheless, in spite of a widespread dissemination of facts regarding the industry, there are a great many persons who find it difficult to realize that upward of 30,000 individual units are engaged in the numerous activities of producing, processing and distributing petroleum products. With each of these actively seeking to maintain or improve its position, oil easily takes rank as one of the country's most highly competitive industries.

Developments of the postwar period, particularly during the flurries occasioned by fears of possible shortage in certain products, have directed much attention to the competition between oil and coal, which has been going on for half a century, and to the steadily rising importance of the former as an agency of heat and power. Coal's once predominant position has been gradually whittled down in the United States until liquid fuel has now taken the lead, though in the rest of the world coal remains well in the lead. What is not so widely recognized is that, aside from this inter-industry movement, there is, among hydrocarbons, an intra-industry competition in constant operation which is bringing about changes and affecting the relative position of certain widely used products.

WHILE crude oil and natural gas follow separate courses and, to a great extent, are handled by separate companies after leaving their original reservoirs, they are closely linked and to an important degree perform similar functions in their end uses. Occurring together in nature, they have to be produced simultaneously in many instances, though in some cases one or the other may predominate.

This close relationship has been recognized during the past three years in the annual reports of the Committee on Reserves of the American Petroleum Institute, by inclusion of natural gas liquids along with crude oil in its estimates of the nation's known reserves. At the end of 1949 natural gas liquids were computed at 180 trillion cubic feet, equivalent to about three and three-quarter billion barrels of oil, and formed something over 13 percent of the total known supply.

Natural gas has been used for many years in various parts of the country for home and industrial heating, but its consumption will be greatly increased in the near future by the completion of large-capacity pipelines now building from Texas fields to the populous and highly industrialized areas along the Atlantic and Pacific coasts. It undoubtedly will displace many coal-burning installations, but it also will supplant oil-burning equipment in some localities. A recent estimate by A. J. McIntosh, economist of the Socony-Vacuum Oil Company, placed the probable new use of natural gas by 1953 as equivalent to 518,000 barrels of oil daily, of which possibly half might be in substitution for oil-burning equipment. Should this be the result, it will not mean a decrease in fuel oil consumption but a slowing down of the rapid rate at which this has been growing and a release of refining facilities to other products.

A DEVELOPMENT which refiners have been viewing with some concern is the growing supply of natural gasoline from casinghead gas which takes the place of a certain amount of refinery gasoline. Another change that is proceeding steadily is the growth in demand for diesel oil, which in power plant operation and railway transportation is releasing quantities of lower grade fuel oil previously used. This is a welcome exchange from the refiner's viewpoint, since it substitutes a higher grade product for one of lower value, but it also involves a change in the ratio of products to which his crude is allocated. In the same direction the increase in the compression ratio of motor cars is being accelerated, creating a larger demand for high octane motor fuel. Adoption of jet planes for commercial use may portend another fuel change in a different direction.

These and other developments that are on the horizon or actually under way are examples of the intra-industry competition that is forcing constant changes and improvements upon the oil industry and producing effects that are felt throughout its parts. Twenty years ago there was much talk among oil men about superior and inferior uses. As a general economic principle it is, of course, desirable that the largest possible percentage of each barrel of crude be devoted to the making of the higher grade products for which no substitutes are readily available, but this requires also that refiners keep readjusting their sights and investing large sums in adapting their facilities to changing demands.

Federal Energy Control Backers Use Imports To Spark New Drive

By JOSEPH HUTTLINGER

THE question of oil imports to the United States continues a problem at Washington but with a new twist. Congress shows signs of favoring a hands off policy but now the executive branch, led by President Truman, emerges as a possible source of action. Since a strong group in the cabinet is against import restriction as a national policy the implication is that the President is remembering that this is election year.

House Speaker Sam Rayburn of Texas is working to block any restrictive legislation on the theory that it would lead to more government controls over petroleum, bring many other industries clamoring to Congress for special protection, and run counter to all of America's "open door" foreign policy.

Speaker Rayburn points out that the imports issue is providing the springboard for an entirely new drive on the part of some in the government to carve out a national energy policy, leading, perhaps, to widespread government controls over the four major fuels: coal, oil, water power and natural gas. The idea has exercised a peculiar fascination for government planners since the start of the New Deal. It thrives in times of distress of any one of the fuels.

Government energy control people urge a study of all the factors influencing the fuels, production, prices, marketing, imports and exports, and the competitive relationship of all the fuels. Creation of a government National Fuel Commission to oversee the fuels is suggested. It is apparent to some observers that if such a commission were created by Congress, it would get into price control in some fashion, and perhaps into end use. Oil use as fuel, for example, might be restricted by a powerful commission in the federal government.

Several bills to launch such a study have been introduced by administration leaders in both the House and Senate. Secretary Chapman is pushing them. And the draft of a plan for just such a commission is now going the rounds of top government officials.

Anti-restriction forces have been aided by the recent report from the House Commerce Subcommittee on petroleum imports. First of three Congressional committees to report on its studies into imports, the group calls for a wait and see attitude. Any law to set up quotas or hike tariffs as high as $1.05 a barrel would have "far-reaching effects" warns the report issued by Rep. Oren Harris (D., Ark.) chairman. Further, there's a question whether U. S. producers are suffering much, the report explains. Imports have had "substantial effect," but they may decline, if two developments come about, Harris says. One is settlement in "helpful fashion" of the Anglo-American problem over markets in sterling areas; the other is "voluntary restraint" by importing companies. The chairman explains such voluntary action has been promised, but "so far the import rate is continuing to go up." He furnishes these figures on oil imports:

	Barrels Daily
First three months of 1949	767,000
January, 1950	923,000
February	657,000
March	914,402

Chairman Wright Patman (D., Texas) and other oil-state Congressmen in both House and Senate differ; they may continue to urge speedy, specific action by Congress or the President to limit oil imports, but if Congress were going to do something, it is at least probable that it would have inserted an amendment into the Economic Cooperation Administration Act, which has just been authorized for another year. There were threats that amendments would be inserted banning financial aid to Britain if she "discriminates" against American oil. When the bill was sent to the White House it merely carried a section providing "it is the sense of Congress" that no participating country shall discriminate against American products by embargo or discriminatory practices. Since a provision which implied just this already was in the act, the section adds little new to the ECA measure.

As the result of requests from political leaders who fear that Congress will not act on pending import restrictions, the President asked his Cabinet for suggestions, and sent written memoranda to State and Interior Departments in May explaining that the imports situation is having a serious impact on both coal and oil industries of America. It is doubtful however if anything more than moral suasion will be attempted.

The House Ways and Means Committee has declined to follow the President's recommendation for lowering the depletion allowance to oil and gas producers and actually has voted to extend the present allowance to other running industries not heretofore included. Meanwhile Mr. Truman has sought to strengthen his position on this matter by nominating Dr. Roy Blough as a member of his Council of Economic Advisers. Confirmation by the Senate would send the economist into a post where he would be one of three principal advisers to the President and the cabinet on taxation, employment, spending and production.

Dr. Blough, who was eight years director of the Treasury Department's tax research division, and spent the last three years at the University of Chicago as a professor of economics and political science, was the mastermind behind the 1942 drive against the depletion allowance. He has urged private economics groups to support the elimination of the allowance. He was an adviser this year when the Treasury again tried to persuade Congress to reduce the allowance.

* * *

The Justice Department's antitrust suit against seven major West Coast oil companies, is one of the most sweeping against the oil industry in a decade. Divorcement of wholesale and retail marketing departments and the end of the California proration system are asked. The complaint charges antitrust violations in the production, transportation, refining and marketing of petroleum in the West. Antitrust suits against the oil industry now span the nation, with Sun Oil Company of Philadelphia under fire on the assertion that some of its salesmen coerced dealers into handling Sun products.

The companies named as defendants on the West Coast are: Standard Oil of Calif., The Texas Co., Shell Oil Co. Inc., Tide Water Associated Oil Co., Richfield Oil Corp., General Petroleum Corp., and Union Oil Co. Also named was the Conservation Committee of California Oil Producers.

Herbert A. Bergson, assistant attorney general in charge of the antitrust division, said in commenting on the case: "This suit seeks to dissipate the power of defendant oil companies to control the West Coast oil industry by providing: (1) the abolition of the private prorate system at the production level; (2) the assumption by the majors of a true common-carrier status with respect to the operation of their pipelines and other transportation facilities; and (3) the opening of the refined products market to real competition by requiring the defendant majors to retire from both the retail and wholesale marketing levels (a) by disposing of their bulk stations, (b) by disposing of their company-owned retail service stations, and (c) by freeing company-controlled stations from the obligation of selling exclusively the products of the defendant lessor."

Oil company comment on the case suggested that it was another effort of government to legislate against bigness through the courts rather than through Congress. T. S. Petersen, president of Standard of California, said that the suit seems to be based on the 18-month federal grand jury investigation in Los Angeles which was ended a year ago by refusal of the jury to vote an indictment. He pointed out that the jury studied a great mass of oil company records and concluded there was no basis for an indictment.

"When an oil company drills 'dry hole' it abandons the project as an honest mistake. The failure of the grand jury to take action brands these charges as being such a legal 'dry hole,'" Mr. Petersen said.

Process equipment area showing gasoline fractionator, deethanizer, depropanizer, debutanizer, still and rectifier, propanizer-reabsorber, dehydrators and absorbers. Elwood Payne photo.

Boussens Gasoline Plant

LPGas, Motor Fuel, Naphtha and Kerosene Are Produced at Modern Natural Gasoline Plant in the St. Marcet Field in the Pyrenees Foothills

by FRANCOIS deBOULARD

REGIE Autonome des Petroles, a French, government-owned company, placed in operation in April 1949 a high-pressure gas processing and dehydration plant designed by Hudson Engineering Corp. and constructed with equipment purchased in the United States. The plant is located at Boussens in the southwestern part of France in the foothills of the Pyrenees Mountains. Gas processed in the plant is produced from the St. Marcet field which was discovered in 1939. The St. Marcet field is the major hydrocarbon deposit now known in France, with the exception of the old Pechelbronn field in Alsace. Active exploration with modern drilling equipment is now being carried on in other sedimentary basins where showings of oil and gas have been found.

Gas from the St. Marcet field is produced at 5,000 feet depth from fractured limestone and dolomite formations of the middle Cretaceous period under a thick cover of shales. The structure is an anticline with axis extending parallel to the Pyrenees Mountains, about four miles long and three-fourths mile wide. The field produces typical condensate-bearing gas containing approximately .96 gallon of recoverable hydrocarbons per thousand cubic feet. The gas is quite similar in composition to that produced from many such fields in the United States, particularly those in Texas and the Gulf Coast area. The gas contains no hydrogen sulfide and only traces of carbon dioxide. A small volume of oil is produced from a limited portion of the southern flank of the field.

Gas production began in 1942 at a voluntarily limited rate during the German occupation. After the German occupation a major program involving construction of an extensive pipeline system and of the new processing plant was decided upon. This program was completed in 1949 at a total investment of more than four billion francs with the simultaneous starting of the Boussens plant and the Toulouse-Bordeaux gas pipeline.

At the present time 12 producing wells have been completed, six of which have open-flow capacities between 20 and 50 million cubic feet per day. They are equipped with 2½-inch tubing inside 6⅝-inch casing cemented

F. deBoulard, chief engineer of the production department of Regie Autonome des Petroles.

and gun perforated in the gas levels. Packers and tubing chokes have been installed in the larger capacity wells for safety purposes.

Initial rock pressure was 2,300 psig. To date approximately 32 billion cubic feet of gas have been produced. Reserves are estimated at approximately 150 billion cubic feet. Present daily production is 25 to 30 million cubic feet and is expected soon to reach 35 million. To provide for increased production from possible new discoveries in the area, the distribution system and the Boussens plant were designed for a capacity of 42 million cubic feet per day and can be easily increased to 52 million cubic feet per day.

Field gathering lines, two to four inches in diameter, collect gas at wellhead pressures and conduct it to a central separator installation located at the head of the pipeline from the field to the Boussens plant. This line is 9½ inches in diameter, 11 miles long, and designed for a maximum working pressure of 1,500 psig. The field separator installation removes approximately 80 percent of the free water contained in the gas. Condensate removed in the separators is reinjected into the gas line and flows with the gas to the plant.

Gas in the line is subject to hydrate freezing during winter months, since ground temperatures at the depth of the line are frequently below 45°F. The situation is worsened by several changes of more than 400 feet in altitude of the line, with liquid tending to accumulate in large quantities in the low sections. Hydrate formation has been successfully prevented by the continuous injection during cold weather of methyl alcohol at the rate of from 100 to 120 gallons a day.

Gas enters the plant at Boussens through a horizontal separator sized to accommodate the largest volume of liquid which, from calculations, was considered possible to accumulate in any section in the line from the field. Liquid from this inlet separator flows into the distillate flash tank and from there to the distillate Propanizer* and into the raw product feed tank. The rate of flow is semi-controlled and is sufficiently uniform to avoid difficulties which otherwise would be experienced because of accumulations of liquid surging into the plant from low sections in the line from St. Marcet. Gas flows from the inlet separator through a scrubber in which the last traces of liquid hydrocarbons are removed. From the scrubber gas flows through the plant absorbers, where it is countercurrently contacted with lean absorption oil for the removal of propane and heavier hydrocarbons. Leaving the absorbers the gas flows through a solid desiccant type dehydration plant and into the gas transmission line described elsewhere in this article.

Rich oil from the absorbers flows into the rich oil flash tank operating at approximately 200 psig and into the rich oil Propanizer operating at approximately 120 psig. Vapors removed as a result of the first pressure reduction plus vapors from the distillate flash tank are combined and recompressed for reinjection into the gas stream entering the plant.

One of the features of the plant is the use of the Propanizer process for stripping methane from rich oil and from distillate, at the same time increasing propane absorbed in these media. The use of the Propanizer increases recovery of propane from the plant without increasing oil circulation and with a minimum increase in equipment cost and in fuel gas consumption.

Hydrocarbons absorbed from the gas by the absorption oil and retained in the oil after it leaves the Propanizer are removed by steam distillation, are condensed and are combined with distillate from the distillate Propanizer. The combined raw product is then separated into finished marketable products of high purity in the fractionating plant. These products include propane, butanes, motor fuel, kerosene or naphtha, tractor fuel or absorption oil, and fuel oil. The motor fuel is blended with tetraethyl lead and the octane number increased from 62 clear to 70 or 80, depending upon the quantity of tetraethyl lead used.

Construction on the Boussens plant was started in August 1947. Equipment began arriving from the United States in January 1948. Approximately 1,500 tons of equipment, including pressure vessels, heat exchangers, pumps, boilers, gas engines and similar items were shipped from the United States. Approximately 1,000 tons of equipment, consisting mainly of storage tanks and steel pipe, were manufactured in France. The plant was mechanically completed and hydrostatically tested during November 1948.

Residue gas from the plant is distributed to the cities and principal industries in the southwestern part of France through a pipeline system approximately 500 miles long and from four to 12 inches in diameter. The first line to Toulouse, approximately 50 miles, was laid in 1942, but most of the system was installed after 1945. The last and most extensive installation was the Toulouse-Bordeaux pipeline, 168 miles of eight-inch pipe, which was completed in 1948 in less than ten months through a densely populated area. A total of more than 20,600 tons of steel pipe were used, all of which was furnished by French pipe mills. The pipe joints are electrically welded. The system is installed for a maximum working pressure of 850 psig. Careful study was given to the protection of the pipe against electrolytic corrosion due to its proximity to numerous electric railroads. All

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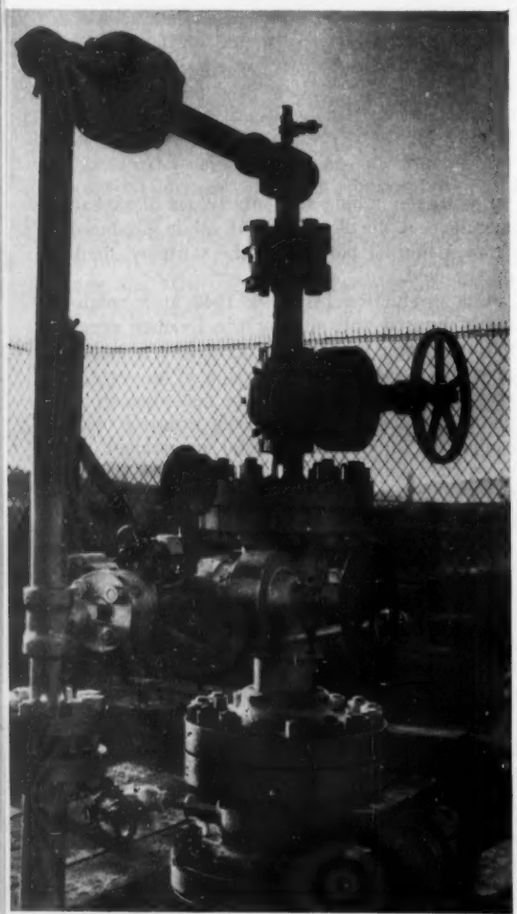
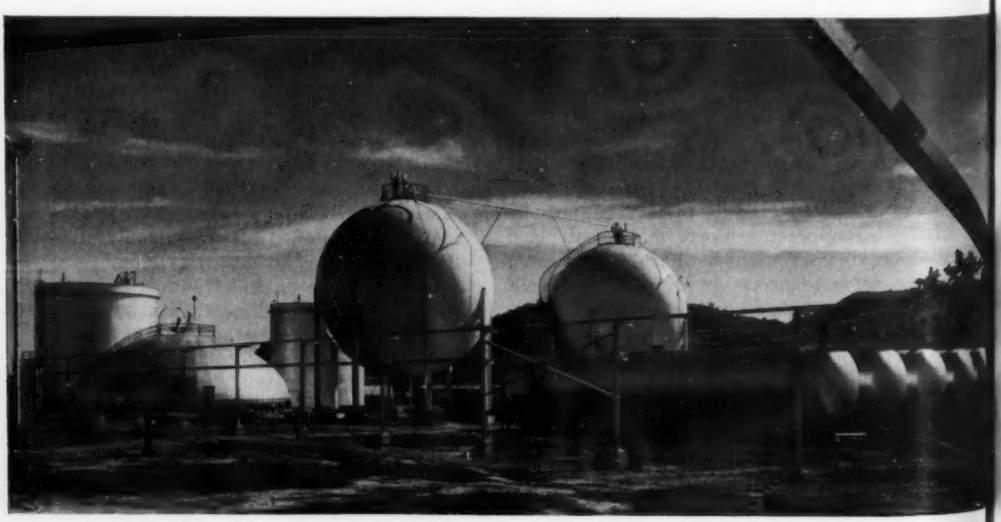
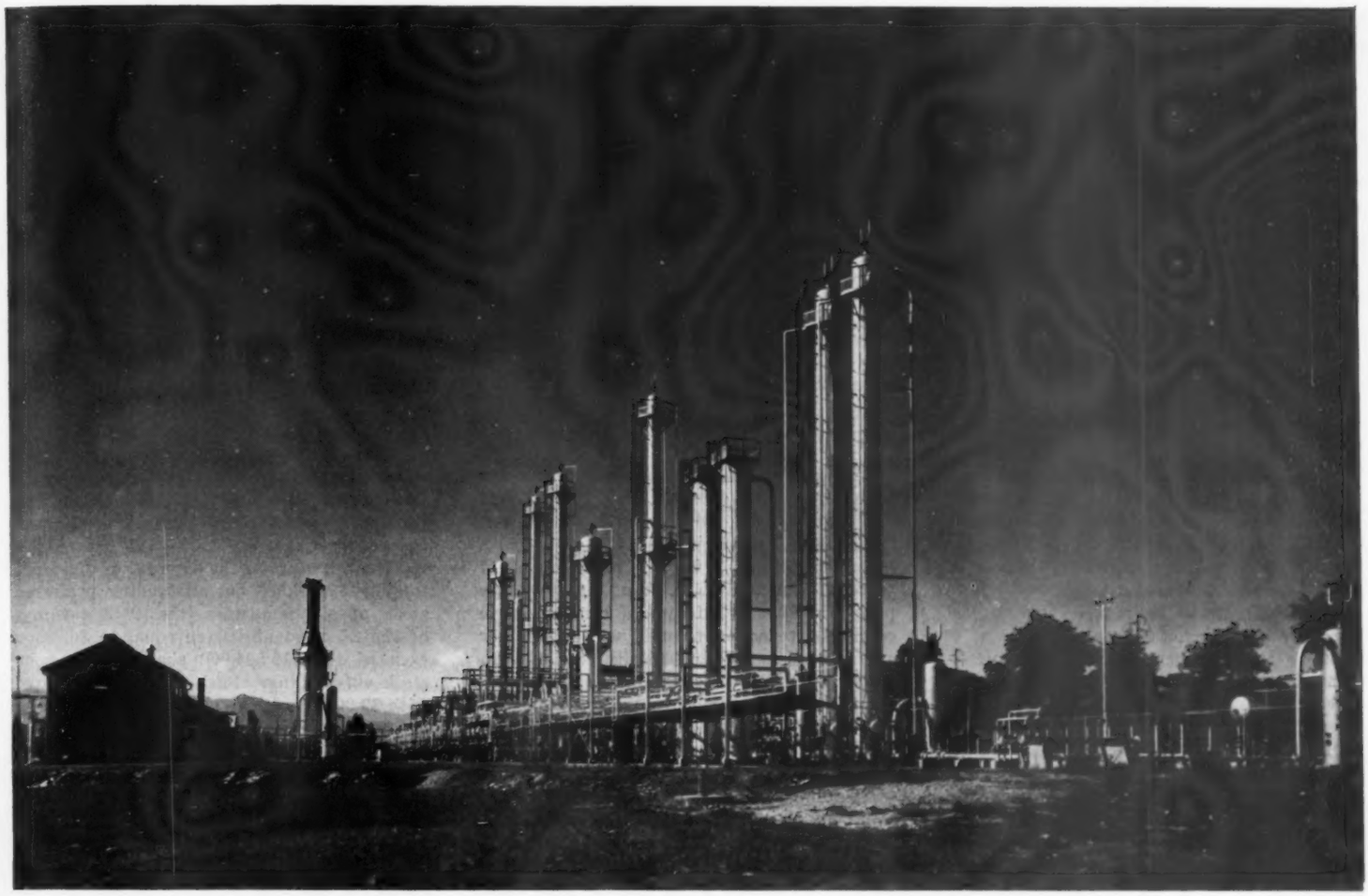


St. Marcet well No. 7 which has an open-flow capacity of 65 million cubic feet daily. Yan photo.

Storage area. Group of 850-barrel propane tanks at right behind which are two 5,000-barrel butane tanks. Propane tanks were fabricated in France by Schneider et Cie. and butane tanks were fabricated by Chicago Bridge & Iron Co. and shipped to France for erection. At left of butane spheres is a Caquot "water drop" 7,000-barrel gasoline tank designed by Entreprises Metropolitaines et Coloniales with a working pressure of 125 inches of water. It contains about 80,000 pounds of steel. Floating roof tanks for less volatile products are in background. Elwood Payne photo.





Looking south toward the Pyrenees mountains from the inlet separator and scrubber down the line of process equipment from absorbers to gasoline fractionator. Rich oil heater stands between process equipment and pumphouse. Elwood Payne photo.

lines are protected with a coating of coal tar enamel, 1/6 to 1/4-inch thick, covered with fibre glass wrapping. Cathodic protection has been installed along the entire system.

Dry gas is delivered from the Boussens plant to city distribution systems or to industrial plants at pressures reduced to approximately 50 psi through metering stations. Gas sales are expected to reach 8.75 billion cubic feet in 1950. The gas is distributed approximately as follows:

(1) *City Gas Consumption.* Approximately 25 percent of the gas is delivered either undiluted or reduced by cracking to the Btu content of manufactured gas. Since natural gas became available, the consumption in cities has considerably increased, in some cases being doubled.

(2) *Industrial Gas.* About 50 percent of the gas is used by industrial plants in steam boilers or in furnaces. One open hearth steel furnace operates on natural gas. Recently a new and improved development has been started with the production of hydrogen for manufacturing commercial fertilizers. Three gas-cracking plants are now operating, the larger one of American design, operated by the Office National de l'Azote at Toulouse. It has a capacity of five million cubic feet per day of natural gas.

(3) *Compressed Gas for Motor Fuel.* Approximately 25 percent of the gas is compressed to 3,000 psig and used as fuel in motor vehicles equipped with high-pressure containers. Although gasoline is now available without ration coupons, the cost of compressed gas, which is half that of gasoline on a mileage basis, still makes it attractive for the consumers, especially in trucks and buses.

Gasoline production from the plant is now 15,000 to 18,000 gallons per day. It is sold as regular motor fuel after blending with 0.5cc of tetraethyl lead, which brings the octane number from 62 clear to 70, which is the French standard. The high lead susceptibility of the gasoline makes it a splendid base for high-grade motor fuel, since with 2cc of tetraethyl lead the octane number can be increased to more than 80. Such gasoline is not now authorized as motor fuel by the French government.

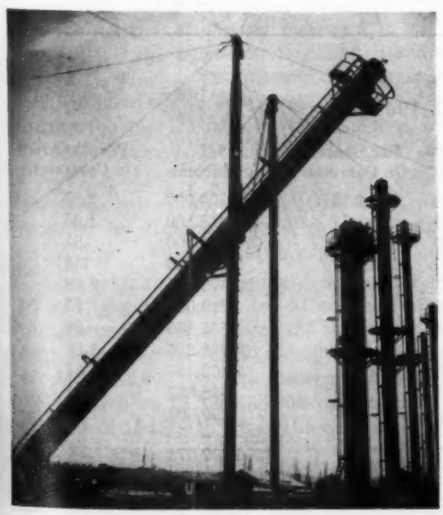
Butane is produced at a rate of 20 to 25 tons per day (8,500 to 11,000 gallons). It is bottled in containers of 13 kilograms (about 28 pounds) for domestic uses.

Propane production is presently limited by market demand to approximately 6½ tons a day (about 3,000 gallons). Potential production is more than double this figure, and with rapidly increasing demand due to new developments for the use of propane, it is expected that the plant will soon be producing at full capacity.

A bottling plant for both propane and butane has been erected by Regie Autonome des Petroles at the gate of the gasoline plant, at a cost of approximately 150 million francs. This bottling plant started operation last July and is able to handle the entire production of propane and butane from the Boussens plant.

About 7,000 gallons a day of naphtha, kerosene, tractor fuel and fuel oil, which can be manufactured to a wide range of specifications, are produced from the plant.

Erecting reabsorber-propanizer. Photo by Yan.



Profits Second Largest in History

Lowered Prices for Refined Products and More Severe Proration Cut Industry's Net Income 26.7 Per Cent. Capital Expenditures are Reduced and Dividends to Stockholders Increased

By HENRY E. ROSE

LOWER prices for principal refined products, together with a curtailment in crude oil production, caused earnings of the American oil industry to decline by 26.7 percent in 1949 as compared with the record year of 1948. As against pre-war, 1941, last year's earnings were up by 170 percent, and marked the second best in oil industry history.

Last year's total demand for oil products—domestic and export—came within 4/10 of 1 percent of matching the record in 1948. Thus far in 1950 crude oil production is averaging slightly more than 7 percent less than in the corresponding period of 1949, while demand for crude oil and products is running somewhat higher than a year ago. This higher demand has been reflected in a reduction in inventories of products and crude oil, predicating the need for higher allowable crude production. Two states, Texas and Kansas, had ordered increased output during May.

With the stock position in both crude and finished products showing improvement, gasoline prices and some fuel oil prices on the East Coast have been moving upward in recent months, indicating a rising trend for earnings in the period ahead. With particular reference to 1950 earnings, the heads of several large companies told stockholders at recent meetings that the outlook would indicate earnings not substantially below those of 1949, with some opinion that earnings might be somewhat higher than in the year just passed. The indications, moreover, are that demand for products will be moderately above that in the year just closed, perhaps by as much as 5 percent.

Earnings of the industry for the first quarter of 1950, based on the initial 26 reports to become available, show a reduction of 17 percent compared with the corresponding period in 1949. This year's earnings gave continued reflection to mild winter weather and a low demand for fuel oils, coupled with softer prices in the early part of the year.

For these 26 companies, aggregate earnings were $254,100,775 in the initial three months of this year compared with $306,282,073 in the similar period a year earlier. Only seven companies reported moderate increases while the remaining nineteen companies had decreases, some of them being quite substantial.

Table 1 lists the 26 companies with their earnings and per share net on common stock for the March quarter of 1950 as compared with that period a year ago.

For the full year of 1949, the net profits of 26 companies in the American oil industry (three have been added to WORLD PETROLEUM's annual tabulation in the past year), were down by 26.7 percent as compared with 1948, but showed an increase of 10.1 percent compared with 1947. Profits in 1949, in fact, aggregated $1,493,602,000 against $2,039,414,000 in 1948, and $1,356,436,000 in 1947.

All companies in the group of leaders, with the exception of Barnsdall, showed reductions in profits in 1949. Individual decreases ranged from 6 percent to 51 percent, the latter in the case of Mid-Continent. More than half the companies reported declines of 30 percent, or more.

After allowing for the payment of dividends totaling $7,066,932 on outstanding preferred stock of six companies, the 1949 earnings of the 26 companies were equal to $6.79 on each of the 219,304,002 shares of common stock outstanding. Such earnings compared with $9.39 a common share in 1948, and with $6.02 a share in 1947.

Although its profits were down by 26 percent compared with 1948, Standard Oil Co. (N. J.) continued to head the list with the largest net income of the leading companies in 1949. It reported $268,869,501, the equal of $8.91 a share last year on its common stock. Following the New Jersey company in size of profits were Standard of California which reported $137,856,477 last year, and Texas, $132,743,139.

Despite the fact that earnings during 1949 for the 26 leading companies were down by 26.7 percent, the cash dividend payments on common stock, in the aggregate, were at a new high record. Such dividends totaled $611,267,369, or 16.9 percent greater than in 1948, the previous record year, and 34 percent higher than were disbursed in 1947. Last year's common dividend payments, moreover, were at the highest ratio to earnings in several years. They were equal to 40 percent of earnings whereas in 1948 they were at the lowest ratio in many years—25 percent. In

Table 1

First Quarter Earnings of 26 Companies, 1950 Compared With 1949.

	1950 Net Income	Per Share On Common	1949 Net Income	Per Share On Common		1950 Net Income	Per Share On Common	1949 Net Income	Per Share On Common
Amerada	$3,283,335	$2.08	$4,956,659	$3.14	Standard, N. J.	65,000,000	2.15	75,000,000	2.53
Anderson-Prichard	857,430	1.05	1,337,819	1.64	Standard, Ohio	2,722,733	.71	3,912,160	1.03
Atlantic Rfg.	8,710,970	3.09	7,729,027	2.73	Socony-Vacuum	22,000,000	.69	26,000,000	.81
Barnsdall	3,730,171	2.19	3,619,055	1.74	Sunray	2,961,000	.49	2,785,000	.46
Continental	8,139,303	1.69	10,834,635	2.25	Texas	23,960,183	1.74	28,870,111	2.08
Gulf	25,957,000	2.29	28,939,000	2.55	Texas, Gulf Pdcg	729,276	.67	773,541	.75
Houston	1,603,266	1.46	1,522,411	1.38	Tex. Pac. C. & O.	1,315,381	.74	1,659,159	.94
Lion	3,709,526	1.58	2,222,779	.95	Tide Water	6,152,000	.94	9,020,216	1.38
Phillips	10,049,580	1.66	12,713,254	2.10	Union	1,844,178	.31	7,403,136	1.54
Plymouth	1,390,502	1.16	1,375,909	1.34	Universal Consol.	435,386	1.56	568,057	2.04
Richfield	3,571,439	.89	5,057,329	1.26	Wilcox	158,312	.56	90,004	.32
Shell	22,060,639	1.64	21,421,909	1.59					
Skelly	5,682,708	4.35	7,783,921	6.55	TOTAL	$254,100,775		$306,282,073	
Standard, Cal.	24,924,457	1.74	37,389,982	2.61	Decrease	17%			
Standard, Ky.	3,152,000	1.21	3,297,000	1.26					

1947 the 26 companies paid out the equivalent of 34.8 percent of their earnings in cash dividends on common stock.

Of the companies used in WORLD PETROLEUM's annual financial survey, nine increased the rates of payment of cash on their common stock last year as compared with 1948. Three reduced payments and 14 paid at rates unchanged from a year earlier.

Accounting largely for the increased cash payments on common stock last year was Standard Oil Co. (N. J.) which disbursed dividends of $4 a share, or a total of $119,755,901 against only $2 in cash in 1948 (stock dividends were paid also) or $55,889,204. New Jersey's cash dividend payments, incidentally, were the largest of the leading oil companies during 1949.

With a few exceptions, capital expenditures by companies in the oil industry during 1949 were not at the same record level as in the two previous years of 1947 and 1948. The reduction in capital expenditures last year was largely the result of a betterment in the outlook for supplies. As expressed by Robert E. Wilson, chairman, and A. W. Peake, president, of Standard Oil Co. (Indiana):

"We began putting the brakes on such spending in August 1948 when the supply outlook began to improve. In November came the threat of excess-profits taxes of unknown size, and we curtailed further. Early in 1949 it became clear that both demand and prices were falling. The need for rapid expansion had passed."

Because of its effect on earnings, and the incentive to drill for new oil reserves, several executives in the industry commented, in their annual reports, on the government's proposal to reduce or eliminate the depletion allowance. B. B. Jennings, president of Socony-Vacuum Oil Co., Inc., said that such proposals "constitute a threat to the oil producing industry. This allowance has been absorbed into the overall economy of oil production. Were this allowance to be reduced or eliminated it appears inevitable that the price of oil would have to increase."

Aided partly by additional borrowings in the form of long term debts, and earnings in excess of dividend disbursements, the net working capital position of the 26 leading companies showed an improvement of $317,907,000 at the end of 1949 to the highest level on record. Such working capital amounted to $3,492,090,000 for these companies and compared with $2,840,209,000 at the end of 1947. Fifteen companies showed increases in working capital, the most notable being Standard (N. J.), which was followed by Barnsdall (which incurred a new debt of $37,000,000 during the year), Cities Service, Shell, Standard (California), Standard (Indiana), and Plymouth.

Sizable reductions, on the other hand, were reported by Humble, Skelly, Socony-Vacuum and Texas in their working capital.

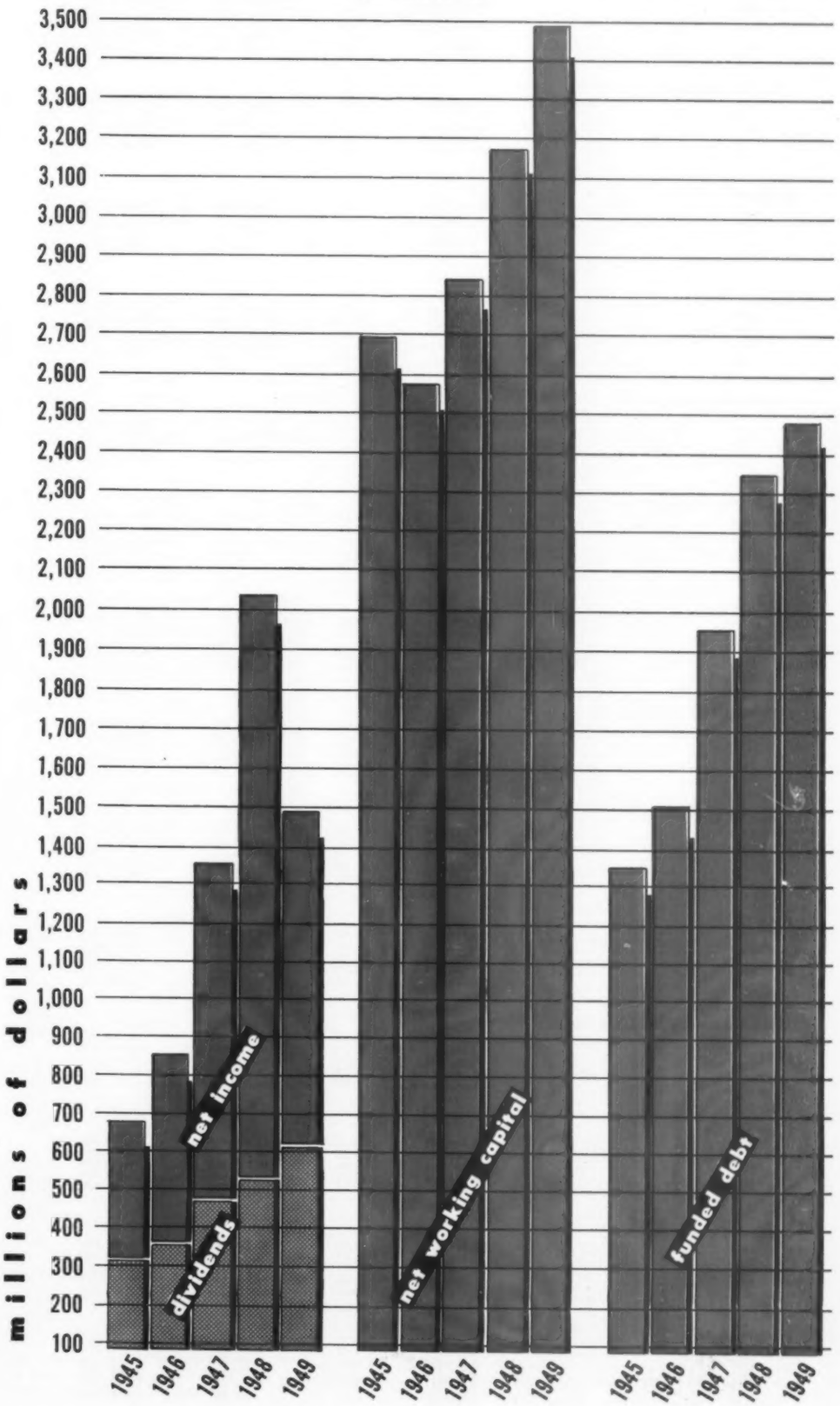
A new high record also was made on funded and long term debt for 21 of the leading companies last year. As of the year-end, such debt amounted to $2,480,463,000, an increase of $133,282,000 for 20 companies a year earlier, and of $1,128,435,000 compared with the end of 1945, just after the close of World War II.

The major increase in such debt last year was reported by Standard (N. J.) of $245,300,000 compared with the close of 1948. The next largest increase was shown by Standard (Indiana) of $37,500,000, followed by Standard (California) with $33,000,000 and Union with $25,300,000.

In contrast, there were several reductions in funded debts, the largest being $88,100,000 for Cities Service, and $10,500,000 for Socony-Vacuum Oil Co., Inc.

In the accompanying tabulation to be found on the following pages is shown the net income, per share earnings on common stock, net working capital and other pertinent financial facts for the 26 American oil companies during 1949 compared with four previous years, and similar facts for two foreign affiliates of Standard Oil Co. (N. J.); namely, Creole Petroleum Corp. and Imperial Oil Ltd.

Comparison of net working capital, funded debt, net income and dividends paid by oil companies in the past five years.



FIVE YEARS FINANCIAL REVIEW OF

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Amerada Corp.								
1949	$14,384,193	$9.12	$21,343,683	$40,883,360	.....	.....	1,577,350	$51,322,326
1948	22,642,252	14.35	23,503,669	32,131,671	.....	.....	1,577,350	44,824,883
1947	14,919,626	9.46	19,050,060	23,891,321	.....	.....	1,577,350	31,646,731
1946	8,855,975	5.61	12,911,224	20,080,891	.....	.....	(D) 1,577,350	21,459,134
1945	5,396,770	6.84	9,471,634	17,225,600	.....	.....	788,675	15,560,710
Atlantic Refining Co.								
1949	27,210,432	9.51	54,697,673	271,811,844	$34,534,054	477,980	2,660,911	179,954,862
1948	35,657,124	12.68	49,636,811	251,779,652	27,890,000	499,980	2,660,911	159,978,172
1947	15,897,652	5.32	57,559,600	224,124,689	34,210,000	500,000	2,660,867	131,137,496
1946	9,632,926	3.26	43,317,784	205,560,012	37,211,229	148,000	2,663,998	121,547,604
1945	1,509,107	.34	46,293,657	189,688,970	40,179,220	148,000	2,663,998	115,626,758
Barnsdall Oil Co.								
1949	14,852,469	7.96	32,815,681	43,476,202	37,000,000	.....	1,865,800	46,470,918
1948	13,473,629	6.06	12,639,602	29,348,473	.....	.....	2,223,307	31,276,725
1947	9,119,030	4.10	11,848,245	23,417,011	.....	.....	2,223,307	24,453,607
1946	5,113,811	2.30	9,056,280	19,222,629	.....	.....	2,223,307	17,666,642
1945	4,389,779	1.97	6,533,192	17,798,321	.....	.....	2,223,307	13,717,216
Cities Service								
1949	55,057,822	14.87	180,542,106	612,656,328	423,944,945	.....	3,702,000	(A) 290,366,048
1948	65,777,039	17.17	161,867,520	657,955,713	512,082,756	.....	3,702,000	221,112,932
1947	40,464,786	10.93	134,090,822	650,027,901	487,244,688	.....	3,702,000	176,697,841
1946	27,253,121	6.41	175,563,864	588,671,374	390,113,298	664,300	3,702,000	171,581,152
1945	15,060,544	3.12	149,528,368	588,099,810	390,682,259	664,300	3,702,000	138,453,860
Continental Oil Co.								
1949	36,096,880	7.48	57,100,861	152,660,205	1,427,783	.....	4,823,858	202,397,966
1948	54,216,729	11.24	59,351,453	136,635,762	1,475,475	.....	4,823,458	185,594,215
1947	31,356,663	6.61	38,971,853	119,081,476	1,790,493	.....	4,747,155	144,615,436
1946	19,013,899	4.05	30,935,190	109,472,845	1,118,925	.....	4,694,251	123,359,887
1945	15,142,870	3.23	21,367,915	107,941,335	2,101,890	.....	4,682,557	111,885,294
Creole Petroleum Corp.								
1949	116,149,079	4.49	7,749,771	491,112,483	.....	.....	25,865,310	218,777,063
1948	198,655,625	7.68	19,077,028	440,614,942	.....	.....	25,873,510	205,520,639
1947	130,750,261	5.06	29,956,350	313,568,324	.....	.....	25,865,110	199,636,860
1946	83,305,686	3.13	55,563,445	233,193,158	.....	.....	26,606,610	142,329,526
1945	64,601,781	2.43	47,301,411	169,296,022	.....	.....	26,606,610	105,585,408
Gulf Oil Co.								
1949	100,877,041	8.89	205,847,853	698,395,698	189,969,415	.....	11,345,250	548,839,178
1948	153,539,299	13.53	213,486,462	661,757,676	184,874,046	.....	11,345,250	482,097,887
1947	95,540,059	10.53	129,541,065	577,520,002	184,601,035	.....	9,076,202	307,683,569
1946	58,284,830	6.42	83,221,420	485,799,531	59,672,985	.....	9,076,202	225,865,332
1945	45,213,640	4.98	91,459,870	446,736,575	49,360,719	.....	9,076,202	208,315,892
Humble Oil & Refining Co.								
1949	120,479,526	6.70	138,187,401	631,071,368	50,534,013	.....	17,975,680	247,397,221
1948	186,068,579	10.35	159,083,661	560,663,995	49,491,900	.....	17,975,680	(B) 198,820,415
1947	124,106,877	6.90	116,481,276	481,690,757	42,366,492	.....	17,975,680	259,654,556
1946	71,831,758	4.00	92,101,800	437,500,998	42,739,798	.....	17,975,680	(E) 189,474,719
1945	70,895,006	3.94	101,848,186	384,198,125	43,613,475	.....	17,975,680	269,853,441
Imperial Oil, Ltd.								
1949	23,932,985	.88	147,616,304	115,473,127	50,000,000	.....	27,133,483	157,365,497
1948	22,832,070	.84	110,575,101	96,938,105	30,000,000	.....	27,121,405	133,829,490
1947	20,464,381	.75	87,164,791	76,561,041	24,000,000	.....	27,090,590	72,161,435
1946	17,326,112	.64	61,532,933	54,862,144	.....	.....	26,965,078	65,549,119
1945	16,616,586	.61	74,521,062	38,333,859	.....	.....	26,965,078	59,286,892
Lion Oil								
1949	9,115,161	3.89	13,522,145	50,527,225	25,000,000	.....	2,340,813	28,903,938
1948	11,722,432	5.01	16,316,285	38,091,038	20,000,000	.....	2,340,813	23,299,963
1947	7,991,287	3.42	9,329,424	20,663,888	5,150,000	.....	1,170,355	14,263,294
1946	3,965,779	6.78	10,164,255	14,389,530	5,600,000	.....	585,157	8,320,102
1945	1,670,689	3.84	5,273,786	13,450,116	6,00,000	.....	435,107	5,208,805
Mid-Continent Petroleum Corp.								
1949	12,080,615	6.50	46,504,343	73,068,253	.....	.....	1,857,912	93,815,089
1948	24,681,992	13.28	47,819,261	65,371,738	.....	.....	1,857,912	89,219,111
1947	17,638,933	9.49	42,257,012	52,318,269	.....	.....	1,857,912	73,547,597
1946	10,084,581	5.43	36,546,658	44,163,951	.....	.....	1,857,912	61,578,530
1945	8,062,792	4.34	34,829,652	41,594,097	.....	.....	1,857,912	56,581,775
Ohio Oil Co.								
1949	33,658,767	5.13	52,084,439	121,033,646	.....	.....	6,563,377	93,650,707
1948	49,333,158	7.52	44,052,972	111,654,130	.....	.....	6,563,377	75,087,696
1947	29,161,496	4.44	40,339,466	95,033,850	3,000,000	.....	6,563,377	59,576,609
1946	18,253,236	2.78	42,575,885	81,024,999	8,000,000	.....	6,563,377	41,379,020
1945	13,949,822	2.13	37,001,770	79,673,840	9,500,000	.....	6,563,377	51,804,212
Phillips Petroleum Co.								
1949	44,514,371	7.36	87,299,342	429,938,398	111,719,146	.....	6,048,869	211,729,714
1948	72,630,997	12.01	72,811,100	395,578,350	99,793,245	.....	6,046,917	179,240,920
1947	40,893,647	8.11	66,276,074	291,393,262	41,884,723	.....	6,045,106	124,039,395
1946	22,625,151	4.60	44,550,509	236,560,087	43,833,211	.....	4,916,987	94,182,086
1945	22,571,509	4.50	42,310,294	222,698,646	45,989,518	.....	4,916,987	81,390,969
Plymouth Oil								
1949	6,171,587	5.12	8,429,122	35,792,395	14,701,746	.....	1,205,925	22,186,672
1948	6,594,656	6.88	2,450,786	18,126,383	4,110,663	.....	1,032,948	13,175,597
1947	4,197,420	4.01	2,752,830	16,081,039	5,298,878	.....	1,047,486	9,550,674
1946	2,105,239	2.01	1,136,719	13,422,934	3,527,090	.....	1,047,686	6,860,532
1945	1,730,758	1.65	966,367	11,891,987	2,400,000	.....	1,049,016	6,282,901

UNITED STATES OIL COMPANIES

	Net Income	Per Share of Com.	Net Working Capital	Net Capital Assets	Funded and or Long Term Debt	No. of Pref. Shares	No. of Com. Shares	Surplus
Pure Oil Co.								
1949	**$26,977,116**	**6.22**	**$58,433,570**	**$196,085,492**	**$28,366,321**	**442,434**	**3,982,031**	**$144,025,697**
1948	41,672,136	9.91	57,696,334	181,984,681	30,665,823	442,434	3,982,031	127,223,018
1947	21,197,069	4.77	49,952,231	157,628,084	32,556,242	442,434	3,982,031	95,026,757
1946	17,107,961	3.74	52,038,916	136,931,651	31,064,611	442,434	3,982,031	82,013,518
1945	13,581,770	2.64	55,486,989	126,537,915	32,670,992	442,434	3,982,031	72,094,085
Seaboard Oil Co.								
1949	**5,781,347**	**4.71**	**9,512,775**	**13,988,138**	.....	.....	**1,226,730**	**21,876,673**
1948	6,780,713	5.52	8,290,539	13,028,979	.....	.....	1,228,390	18,548,772
1947	5,941,002	4.83	8,184,998	8,784,163	.....	.....	1,229,230	14,226,425
1946	3,000,586	2.43	4,769,046	8,557,413	.....	.....	1,234,232	10,133,008
1945	2,720,022	2.20	3,332,211	8,508,948	1,733,333	.....	1,234,233	6,663,989
Shell Oil Co.								
1949	**76,422,775**	**5.67**	**146,408,432**	**343,920,204**	**120,672,000**	.....	**13,470,625**	**211,815,030**
1948	111,396,447	8.27	128,595,023	333,981,804	121,797,000	.....	13,470,625	161,846,396
1947	59,874,698	4.44	114,673,825	276,657,900	122,995,000	.....	13,470,625	104,719,558
1946	32,880,417	2.44	179,579,959	191,962,583	124,000,000	.....	13,470,625	63,253,766
1945	28,712,328	2.13	146,416,443	175,254,538	81,641,000	.....	13,470,625	50,579,277
Sinclair Oil Corp.								
1949	**54,073,338**	**4.51**	**192,670,120**	**418,645,905**	**182,410,088**	.....	**11,973,984**	**380,968,272**
1948	81,048,602	6.76	185,922,695	387,116,078	179,588,687	.....	11,974,003	350,838,098
1947	(F) 52,432,125	4.37	(F) 188,291,510	(F) 333,533,008	(F) 181,371,677	.....	11,974,021	(F) 294,424,410
1946	27,607,645	2.30	148,524,551	242,091,785	108,431,680	.....	11,924,041	245,819,783
1945	15,644,749	1.30	158,722,855	213,268,030	110,475,065	.....	11,974,058	230,182,487
Skelly Oil Co.								
1949	**26,186,500**	**20.04**	**19,732,410**	**140,489,953**	**14,000,000**	.....	**1,306,134**	**128,190,677**
1948	38,914,350	36.04	31,846,707	109,483,085	14,800,000	.....	1,079,476	111,635,500
1947	21,090,936	21.49	21,912,251	88,030,205	15,600,000	.....	981,342	77,887,985
1946	10,108,765	10.30	16,291,391	74,599,381	16,400,000	.....	981,348	59,250,404
1945	8,531,274	8.69	16,597,603	67,161,858	17,200,000	.....	981,349	51,104,336
Socony-Vacuum Oil Co., Inc.								
1949	**98,329,305**	**3.09**	**255,232,100**	**771,397,675**	**174,500,000**	.....	**31,801,880**	**606,122,626**
1948	132,800,055	4.18	270,386,514	732,890,440	185,000,000	.....	31,801,880	542,764,612
1947	97,708,927	3.13	265,646,171	637,748,563	140,000,000	.....	31,178,319	450,406,319
1946	58,310,569	1.87	266,082,299	577,619,321	125,000,000	.....	31,178,323	379,813,495
1945	42,301,983	1.36	274,222,734	509,955,895	100,315,279	.....	31,178,323	321,605,393
Standard Oil Co. of California								
1949	**137,856,477**	**10.10**	**237,858,559**	**772,735,397**	**140,235,048**	.....	**13,654,150**	**543,742,703**
1948	161,491,932	12.42	171,851,490	689,503,058	107,217,702	.....	13,654,150	467,365,679
1947	107,268,575	8.25	103,273,784	606,011,265	44,796,559	.....	13,003,953	384,447,313
1946	66,956,611	5.15	90,373,940	519,861,157	40,000,000	.....	13,003,953	320,734,788
1945	55,548,628	4.27	113,442,810	473,027,029	38,500,000	.....	13,003,953	284,503,528
Standard Oil Co. of Indiana								
1949	**102,668,228**	**6.72**	**269,263,654**	**1,022,452,070**	**286,946,517**	.....	**15,284,772**	**701,223,890**
1948	140,079,286	9.16	197,519,086	975,759,328	249,464,586	.....	15,284,793	636,601,618
1947	94,880,715	6.21	199,715,280	797,689,716	174,346,231	.....	15,284,806	542,749,899
1946	67,649,785	4.43	189,970,915	637,231,883	66,982,830	.....	15,284,830	478,439,433
1945	50,340,476	3.29	222,713,624	530,228,098	19,303,041	.....	15,284,880	437,538,439
Standard Oil Co. (N. J.)								
1949	**268,869,501**	**8.91**	**847,264,604**	**2,085,721,726**	**475,710,293**	.....	**30,183,394**	**1,572,656,868**
1948	365,604,976	12.44	659,838,746	1,858,675,283	230,426,922	.....	29,385,435	1,430,465,470
1947	268,626,580	9.83	690,068,515	1,524,122,335	218,503,349	.....	27,333,742	1,134,478,936
1946	177,609,931	6.50	739,031,209	1,274,429,578	198,206,986	.....	27,333,742	971,978,085
1945	154,156,196	5.64	779,818,746	1,137,441,311	203,129,907	.....	27,333,742	857,287,258
Standard Oil Co. of Ohio								
1949	**16,142,164**	**4.26**	**58,321,473**	**128,821,513**	**36,543,089**	**247,900**	**3,574,371**	**96,963,686**
1948	23,783,197	6.39	67,139,680	112,937,258	36,694,040	248,550	3,572,693	88,826,256
1947	16,390,585	4.41	36,823,998	101,377,991	16,257,965	253,035	3,504,835	72,863,521
1946	10,324,797	3.43	30,662,528	84,744,061	16,711,835	252,000	2,737,074	50,138,079
1945	3,713,161	1.10	39,045,305	76,463,002	16,566,863	238,665	(C) 2,676,383	43,686,806
Sun Oil Co.								
1949	**25,177,875**	**4.57**	**56,271,746**	**183,879,729**	**6,000,000**	**93,197**	**5,427,483**	**52,254,581**
1948	42,853,839	8.61	56,413,043	159,135,242	829,494	93,197	4,996,721	54,318,208
1947	24,339,913	5.28	47,718,318	136,500,595	1,005,648	93,197	4,528,532	42,155,774
1946	14,726,551	4.17	49,662,405	114,622,553	6,750,914	93,197	3,434,944	38,452,703
1945	15,666,543	4.44	47,936,056	102,480,572	4,588,218	93,197	3,434,944	25,798,504
The Texas Co.								
1949	**132,743,159**	**9.62**	**321,188,140**	**742,055,255**	**180,128,177**	.....	**13,787,624**	**636,659,536**
1948	165,980,980	12.03	357,156,851	623,009,802	164,208,610	.....	13,797,624	609,058,805
1947	106,312,617	7.90	363,780,648	487,204,696	146,846,291	.....	13,461,096	492,110,494
1946	71,089,267	6.32	131,027,329	413,883,965	147,093,063	.....	11,244,669	359,482,341
1945	51,856,928	4.61	186,332,038	398,787,324	114,498,906	.....	11,244,660	316,801,359
Tide Water Associated Oil Co.								
1949	**27,518,705**	**4.29**	**62,886,797**	**176,302,398**	.....	**172,135**	**6,396,809**	**167,952,298**
1948	39,387,374	6.04	54,708,056	168,523,625	.....	190,480	6,396,809	151,449,858
1947	30,175,955	4.57	55,535,548	153,000,270	4,500,000	225,373	6,396,809	125,748,023
1946	19,757,707	2.93	50,735,936	140,154,130	7,250,000	268,778	6,396,809	98,842,428
1945	18,107,712	2.57	48,056,917	140,459,899	14,250,000	287,887	6,396,809	84,937,733
Union Oil Co. of California								
1949	**20,356,946**	**3.69**	**58,670,963**	**249,372,269**	**79,700,000**	**247,500**	**5,266,270**	**82,192,931**
1948	31,293,147	6.51	49,727,187	194,501,941	54,400,000	250,000	4,666,270	69,947,452
1947	18,910,860	3.85	46,129,154	178,407,499	54,600,000	250,000	4,666,270	49,974,256
1946	9,804,523	1.90	45,265,932	166,822,441	40,000,000	250,000	4,666,270	37,570,420
1945	9,201,123	1.87	56,487,921	154,637,919	40,000,000	250,000	4,666,270	33,399,667

(A) Includes profit of $27,170,082 on sale of investments. (B) After transfer of $175,000,000 to capital stock account. (C) Common stock split two-for-one in 1945. (D) Stock split two-for-one early in 1946. (E) After transferring $124,445,088 of prior year's earnings to capital stock account which is now carried at $300,000,000 against $175,000,000 at December 31, 1945. (F) Adjusted to include the accounts of Venezuelan Petroleum Co. and subsidiaries.

Ringwood, Elk City Focus Attention On Anadarko Geosyncline

By JOSEPH A. KORNFELD*

THE Anadarko basin, lying in portions of four midcontinent states, is the locale of one of the most active drilling and exploration programs in the United States today. Of major importance is the new Elk City field, lying north of the Washita Mountains in southwestern Oklahoma, where 52 deep gas-distillate wells are completed and 21 rigs are in operation, and Ringwood field in northwestern Oklahoma, scene of 62 oil wells and 21 active drilling operations.

Development today in the Anadarko geosyncline may be grouped as follows:

(1) Exploration and development of the highly-folded, faulted zone lying north of the Washita Mountains, such as Elk City and Rocky fields, Oklahoma. As much as 20,000 feet of Paleozoic sediments, principally Pennsylvanian in age, contain important reservoirs, largely gas distillate.

(2) Exploration and development from the Morrowan series overlap along the north rim

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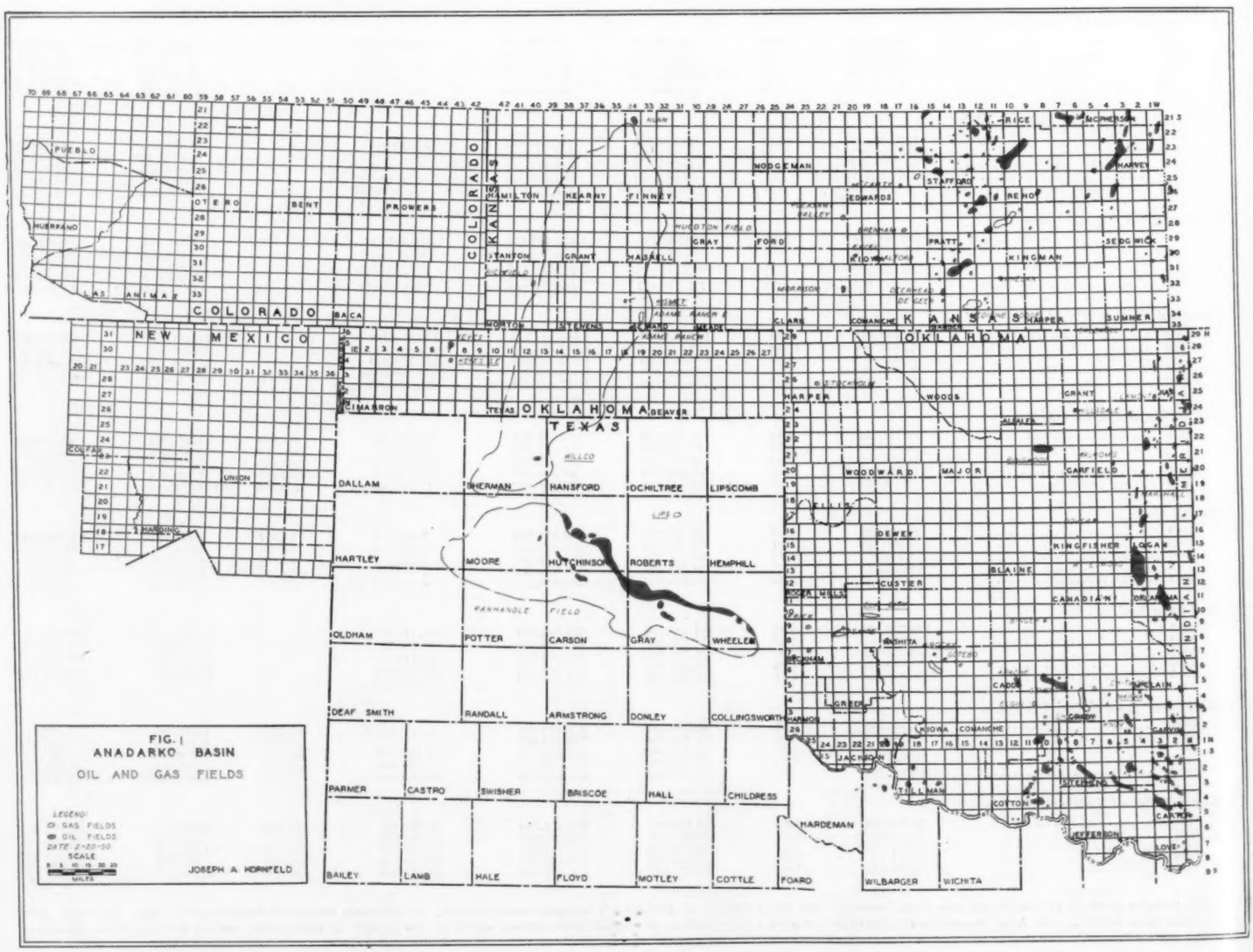


of the Anadarko basin in northwestern Oklahoma and south-western Kansas, like Ringwood field in Major County, Okla.

(3) Search for Simpson sand objective in the Harper basin arm of the geosyncline in Grant and Garfield counties, Okla.

(4) Exploration and development of the Simpson objectives in the Mill Creek syncline portion in central Oklahoma, like Mainka in Grady County, where the Bromide and Tulip Creek members are productive.

(5) Search for Pennsylvanian reservoirs in the Texas Panhandle along a major axis lying north of the Amarillo Mountains. Willco oil pool in Sherman County in a Pennsylvanian oil reservoir and Lips field in Roberts county, are examples of recent discoveries from the lower Paleozoic rocks in this sector.

Elk City in Beckham and Washita counties in southwestern Oklahoma represents one of the most important gas-distillate and crude oil reserves of the Anadarko basin. Currently 52 oil and gas-distillate wells have been completed in the field from the Hoxbar reservoir, ranging from 8,800 to 10,200 feet. Geologic age of the reservoir is the Missouri series of the Pennsylvanian system. Principal operators in the field are Shell Oil Co., United Carbon Co., H. F. Wilcox Oil & Gas Co. and E. Constantin Jr. Shell plans to drill 50 wells in the field during 1950. Currently Shell has 16 operations in the field.

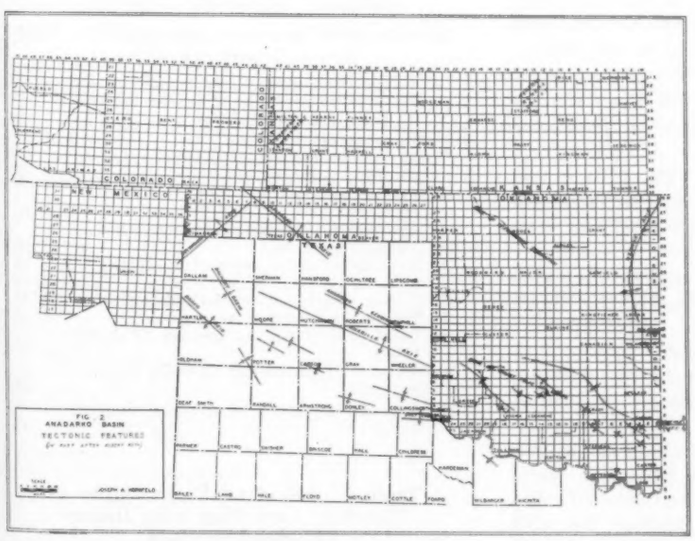
Structure is an elongated anticline trending from west to northwest. More than 400 feet of structural closure is known from existing wells. Crest of the structure lies in section 9, 10, 15 and 16, in T 10 N, R 21 W.

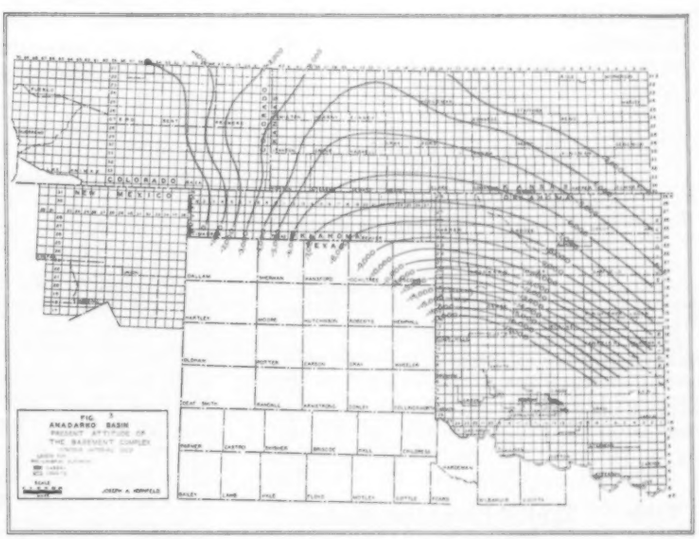
Discovery well is Shell's J. G. Walters 1, located in the center of the NE/4 SW/4, Sec. 14, T 10 N, R 21 W, which was originally completed in November 1947 as a gas-distillate well. Initial completion was 469 barrels of distillate in 24 hours through a half-inch choke with 5,736,000 cubic feet of gas per day from casing perforations at 9,260 to 9,360 feet at a plug-back depth of 10,171 feet. Walters 1 was reworked during January 1950. With plug set at 9,405 feet, it was reperforated from 9,342 to 9,362 feet and flowed 322 barrels of 62.6 gravity fluid through a 20/64-inch choke accompanied by 3,047,000 cubic feet of gas a day. The first oil well was not completed until February 1949 by Shell's Long 1 in the NE/4, Sec. 15, T 10 N, R 21 W.

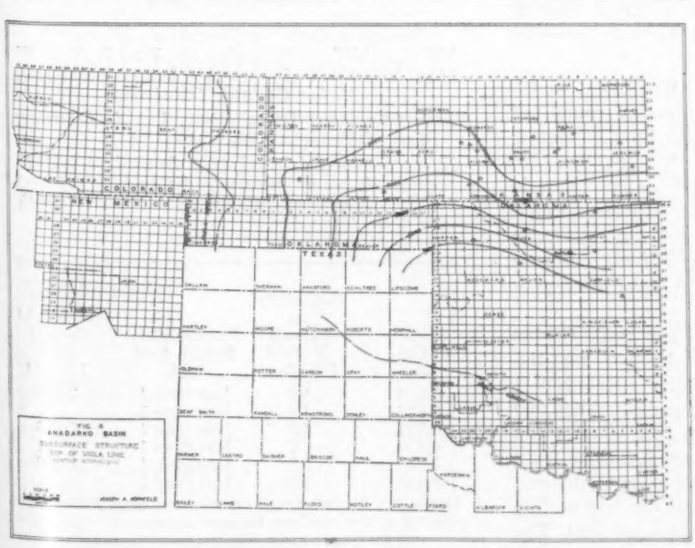
Elk City was extended one and one-half miles eastward on July 21, 1949, with completion of E. Constantin Jr. Lambert 1, located in the center of the SW/4 SW/4, Sec. 18, T 10 N, R 20 W. Originally the well was drilled to a total depth of 10,417 feet but was plugged back and completed through casing perforations from 9,849 to 9,854 feet in the Hoxbar (Pennsylvanian) reservoir. Initial potential was 1,198 barrels of 52 gravity oil and 2,800,000 cubic feet of gas per day through a ½-inch choke on tubing.

Designation as a single common source of supply and 40-acre well spacing covering the Elk City field of Beckham and Washita counties, Okla., was ordered Jan. 18, 1950, by the Oklahoma Corp. Commission when it granted the application of Shell Oil Co. Shell geologists classified the entire pay section as the Hoxbar reservoir of the Pennsylvanian series. The order also established a limiting gas-oil ratio of 4,000 cubic feet of gas per barrel of oil to be effective as of April 1, 1950, following a field-wide test of wells to be conducted under supervision of representatives of the commission. Other rules and regulations promulgated in the order are virtually those practices now followed by field operators.

Major crude oil outlet for the field was completed during 1949 by Shell. A 10-inch, 170-mile line was built from the field to Cushing, Okla., at a cost of $3,500,000. At this time Shell is completing a gas-gathering system to service the new 14-mile gas pipeline of the Consolidated Gas Utilities Co.







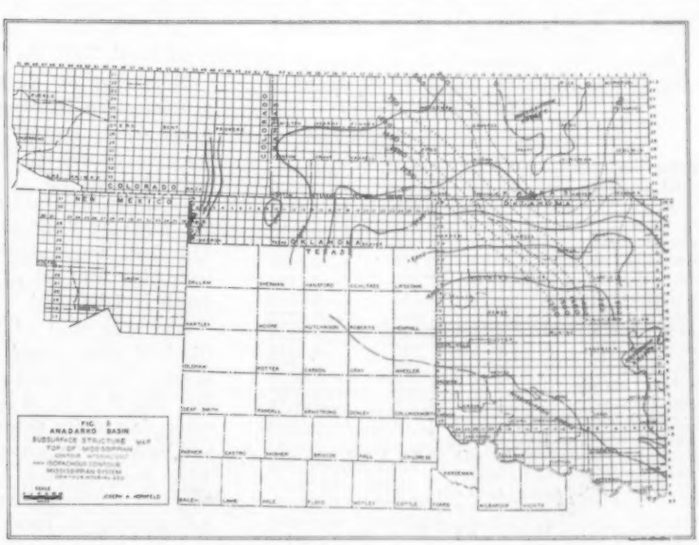


Table 1 Analysis of Drilling Activity

Elk City Field
Beckham and Washita Counties, Oklahoma
(Status as of May 2, 1950)

Operator	Rig Lcn.	Rig Up	Drlg.	Cpltg.	Total
Shell Oil Co.	0	3	10	3	16
United Carbon	1	0	3	0	4
Wilcox Oil & Gas Co.	0	0	0	1	1
Field Total	1	3	13	4	21

Table 2 Ownership Distribution of Producing Wells

Elk City Field
Beckham and Washita Counties, Oklahoma
(Status as of May 2, 1950)

Operator	Number of Completed Wells
E. Constantin, jr.	3
Max Pray	1
Shell Oil Co.	37
Superior Oil Corp.	2
Tidewater Oil Co.	1
United Carbon Co.	4
Wilcox Oil & Gas Co.	4
Field Total	52

Table 3 Analysis of Drilling Activity by Operators

Ringwood Field, Major County, Oklahoma
(Status as of May 2, 1950)

Operator	Rig Lcn.	Rig Up	Drlg.	Cpltg.	Total
C. Andrade III	0	0	1	2	3
Deardorf	1	1	0	0	2
Mazda Oil Corp.	3	0	4	2	9
Superior Oil Corp.	3	0	2	0	5
Tidewater-Mazda	0	0	1	0	1
Trigg Drilling Co.	1	0	0	0	1
Field Total	8	1	8	4	21

Table 4 Ownership Distribution of Producing Oil Wells

Manning Sand Reservoir
Ringwood Field, Major County, Oklahoma
(Status as of May 2, 1950)

Operator	Number of Completed Oil Wells
Atlantic Refining Co.	2
C. Andrade III, Dallas	16
Champlin Refining Co., Enid	2
Mazda Oil Corp., Tulsa	17
Superior Oil Corp.	23
Producers Oil Co.	1
Stephens Oil Co.	1
Field Total	62

Table 5 Typical Formation Marker Summary

Ringwood Field, Manning Sand Reservoir, Major County, Okla.
Superior Oil Company's G. E. Scott 1
NEc NW/4 SE/4 Sec. 27, T 22 N, R 10 W
Surface Elevation: 1,281 ft. d. f.

Formation	Sample Tops (Depth in Feet) Actual	Subsea
Hogshooter lime	5,930	(—4,649)
Lime	6,060	(—4,779)
Big Lime	6,290	(—5,009)
Oswego Lime	6,350	(—5,069)
"Manning" Sand	6,720	(—5,439)
Mississippi Lime	7,000	(—5,719)
Kinderhook Shale	7,585	(—6 304)
Woodford Shale	7.652	(—6,371)
Hunton Lime	7,705	(—6.424)
Sylvan Shale	7,725	(—6,444)
Viola Lime	7,828	(—6.574)
"Wilcox" Sand	8,135	(—6.854)
Total Depth	8,312	(—7,031)
Plug-back Depth	6,746	(—5,465)

Completion Date: July 10, 1947.
Potential: Flowed 72 BOPD 39.5° A.P.I. gravity through 10/64-inch choke.
Casing Record:
10-inch 2,273 ft.
7-inch 6,723 ft.

Shell contemplates construction of a large-scale gasoline plant in the field with a capacity of 100 million cubic feet per day at a cost estimated at $6 million.

Ringwood field in Major county, a 1945 discovery, now has 62 completed oil wells from the Manning sand, a stratigraphic trap in the Morrowan (Pennsylvanian) series. Present developed attributable acreage, based on spacing pattern of 40 acres per well, is 1,720 acres. Proven undeveloped acreage lying along productive contours may add an additional 6,280 acres for a combined present proven acreage of 8,000. At the time of this writing, there were 21 rigs in operation at Ringwood. Offset drilling obligations and expiring lease obligations may step up the volume of drilling activity in this field appreciably within the next few months.

Discovery oil well for the Ringwood field was completed during September 1945 by Superior Oil Corporation's Manning 1, in the NEc NE/4 NW/4 of Sec. 27, T 22 N, R 10 W.

West Ringwood area was discovered during June of 1949 by Mazda Oil Corporation's Boehs 1, in the NEc SW/4 SE/4, Sec. 30, T 22 N, R 10 W, which flowed 82 barrels of 40 gravity oil per day on a ½-inch choke from Manning sand logged from 6,789 to 6,800 feet. Other principal extensions were as follows:

C. Andrade III, School Land, NEc SE/4 NE/4, Sec. 26, T 22 N, R 11 W, 102 barrels of 38 gravity oil per day from Manning sand 6,790-6,900 feet, completed Nov. 20, 1949.

Mazda's Black 1, NEc NW/4 NW/4 Sec. 12, T 21 N, R 10 W, 219 barrels of oil per day from Manning sand 6,804-6,886 feet, completed Feb. 27, 1949.

Superior's Cottom 1, NEc, SW/4 SW/4, Sec. 33, T 22 N, R 10 W, 124 barrels of oil per day from Manning sand 6,810-6,887 feet, completed Feb. 3, 1950.

Two major extensions to the Manning sand reservoir were indicated during March by Superior outpost wells. Successful completions will more than double present ultimate productive limits, barring permeability barriers. Four miles south of production, well 63-30 W. A. Fuller, NEc SW/4 NE/4, Sec. 30, T 21 N, R 10 W, swabbed five barrels of oil hourly following acid treatment. Total depth is 7,307 feet. Three and one-half miles southwest of production, Superior No. 63-9 Stanley Coppock, NEc SW/4 NE/4, Sec. 9, T 21 N, R 11 W, ran pipe to test Manning, total depth 7,105 feet.

Northeast of Rocky in Washita County, southwestern Oklahoma, Stanolind completed a gas field discovery. School Land, Tract 1, NEc SW/4 SW/4, Sec. 36, T 9 N, R 17 W gauged 1,022,000 cubic feet daily. Pay is from a series of acidized perforations, 7,630-70, 7,602-20, 7,560-80, 7.518-45 and 7,498-7,510 feet, total depth 13,505 feet. Seven-inch pipe was set at 12,515 feet; plug-back depth is 7,690 feet.

One mile west of Rocky gas field, Carter Oil drill stem tested a new Hoxbar gas discovery. Lee Galloway 1, NEc NE/4 NW/4 Sec. 22, T 8 N, R 18 W, gauged 3,650,000 cubic feet daily through ⅝-inch chokes top and bottom, opposite casing perforations from 5,312 to 5,327 feet. Earlier during drilling operations this zone recovered 780 feet of 28.2 API gravity oil from 5,305 to 5,355 feet. The well went to 7,616 feet, found good showings in the granite wash, and was plugged back to 5,337 feet.

Northeast of Arnett in Ellis County, northwestern Oklahoma, Barnsdall spudded a 14,000-foot wildcat test, Hanan 1, to the center of SE/4 NW/4, Sec. 1, T 19 N, R 24 W.

Rocky gas field in southern Washita County on the north flank of the Washita Mountains was discovered during March 1946 by the Atlantic Refining Co. and Carter Oil Co. Their Hill 1, located in the NWc, Sec. 25, T 8 N, R 18 W, was completed for an initial open-flow gauge of 50 million cubic feet from sand logged from 6,150 to 6,235 feet. Placed on a ⅜-inch tubing choke, it gauged 6.5 million cubic feet per day. Originally it was drilled to a total depth of 6,500 feet and plugged back to 6,325 feet. Oklahoma Natural Gas Co. has been taking 100 million cubic feet each winter from the well. Interest in the area was revived during February 1950 when Carter's Galloway 1 in the NEc NE/4 NW/4, Sec. 22, T 8 N, R 18 W, one and three-fourths miles northwest of the discovery, encountered 780 feet of 28.2 gravity oil and 30 feet of oil and gas-cut mud on a two-hour drill-stem test from 5,305 to 5,355 feet. A gas sand was logged on a drill-stem test from 5,410 to 5,439 feet. The well lies in an area of highly-faulted and folded Pennsylvanian sediments.

Table 6 Reservoir Statistics

Manning Sand Reservoir, Ringwood Oil Field, Major County, Oklahoma

(Type Structure: Stratigraphic Trap in Morrowan (Pennsylvania) Series.

1.	Highest productive structural contour, Manning sand, subsea	—5,413 ft..
2.	Lowest productive structural contour, Manning sand, subsea	—5,550 ft.
3.	Present productive relief, Manning sand, feet	137 ft.
4.	Average producing depth, derrick-floor measurement, feet	6,782 ft.
5.	Average effective pay section, feet	60
6.	Spacing pattern, acres/well	40
7.	Proven developed attributable acreage	1,720
8.	Proven undeveloped acreage	6,280
9.	Total present proven acreage (Feb. 20, 1950)	8,000 ft.
10.	Number of producing oil wells (Feb. 20, 1950)	43
11.	Average produced oil gravity, degrees A.P.I.	42

Table 7 Effect on Permeability of Treating Core Plug with Dilute Hydrocloric Acid

Champlin Refining Company's Werner 1
NE Cor. NW/4 NW/4 Sec. 29, T 22 N, R 10 W
Manning Sand Reservoir, Ringwood Field, Major County, Oklahoma
Data Courtesy: Dowell, Inc., Leo A. Courder, Mgr., Oklahoma City, Okla.
Note: Samples treated with Dowell 15X-F18 acid, 10 cc. at pressure differential of 100 psi. All samples immersed for same length of time to acid.*

Depth of Core feet	Solubility in Dowell X-Acid Per Cent	Permeability Before Acid md.	Permeability After Acid Dowell 15X-F18 md.
6,800	98	less than 1	2,340
6,818	93	less than 1	....
6,831	92	less than 1	2,255
6,836	7	less than 1	....
6,840	45	less than 1	1,620
6,844	29	less than 1	....

Legend: * 15 per cent hydrochloric acid with addition of a low surface tension agent.

Abandonment was reported of the three-mile-south outpost of Ringwood field drilled by Superior Oil Corp. in the NEc SW/4 NW/4, Sec. 23, T 21 N, R 20 W, which was dry at a total depth of 7,372 feet.

Fifty-five miles southwest of Ringwood field, Stanolind Oil & Gas Co. started operations on a 10,300-foot Pennsylvanian wildcat in Dewey County. Margaret Harper 1 was staked in the center NE/4 NE/4, Sec. 21, T 19 N, R 18 W. In return for drilling this well, Stanolind receives an undivided one-half interest in approximately 4,000 acres leased by Magnolia Petroleum Co.

Southwest Dover field in Kingfisher County on the east flank of the Anadarko basin was discovered during December 1948 by Superior Oil Co. of California from both the Hunton lime and Simpson dolomite reservoirs. The discovery well, Long 1 in the SEc, Sec. 16, T 17 N, R 7 W, was drilled to a total depth of 9,026 feet in the Simpson series. Principal formation markers were logged as follows:

Formation	Depth (Feet)
Oswego lime	6,800 (—5,672)
Chester lime	7,265 (—6,137)
Woodford chert	8,020 (—6,892)
Misener sand	8,053 (—6,925)
Bois d'Arc (Hunton) lime	8,070 (—6,942)
Chimneyhill (Hunton) lime	8,210 (—7,082)
Sylvan shale	8,470 (—7,342)
Simpson dolomite	8,556 (—7,428)
Second Wilcox sand	8,775 (—7,647)
Total depth	9,026 (—7,898)

Table 8 Typical Formation Marker Summary

Southern Sector, Anadarko Basin
Sinclair Prairie Oil Company's German 1
SW/c NW/4 NW/4 Sec. 1, T 6 N, R 13 W
Caddo County, Oklahoma

Formation	Sample Tops (Depth feet)
Springer	2,248
Mississippian	3,380
Weldon	6,547
Woodford	6,585
Hunton	7,045
Sylvan	8,040
Viola	8,280
Simpson	9,030
First Sand Member	9,175
Green Shale Member	9,445
Arbuckle	10,922
Total Depth (in Arbuckle)	11,026

(Note: Observed 60 deg. dip in core from 10,871-10,875)
(Sample log courtesy Sinclair Prairie Oil Company, Tulsa.)

Table 9 Typical Formation Marker Summary

Northeastern Sector, Anadarko Basin
I. T. I. O. Company's Kitchen 1
Center SE/4 SE/4 Sec. 17, T 22 N, R 5 W,
Garfield County, Oklahoma
Surface Elevation 1,221 ft. d. f.

Formation	Sample Tops (Depth in feet) Actual	Subsea
Pawhuska Lime	3,030	(—1,809)
Carmichael	3,648	(—2,427)
Oread Lime	3,810	(—2,589)
Layton Sand	5,015	(—3,794)
Oswego Lime	5,520	(—4,299)
Mississippian	6,113	(—4,892)
Woodford Shale	6,625	(—5,404)
Hunton Lime	6,661	(—5,440)
Sylvan Shale	6,670	(—5,449)
Viola Lime	6,782	(—5,561)
Simpson "Dense"	6,814	(—5,593)
Simpson Dolomite	6,823	(—5,602)
"First" Wilcox	6,878	(—5,657)
"Second" Wilcox	6,934	(—5,713)

(Sample tops courtesy I. T. I. O.)

Hunton lime was perforated from 8,050 to 8,080 feet, opposite the Bois d'Arc member, where it gauged 92 barrels of distillate in 15 hours through a 16/64-inch choke with 4.2 million cubic feet of gas. Simpson dolomite was also perforated from 8,565 to 8,640 feet and tested 81 barrels of distillate in nine hours through a ¼-inch choke accompanied by 4,665,000 cubic feet of gas per day.

The field was extended one-half mile westward during the spring of 1949 with completion of Superior's Kremke 1, in the SEc SW/4, Sec. 16, T 17 N, R 7 W, in the Simpson dolomite. Initial completion was for six barrels of 44.6°API oil and 35 barrels of water a day accompanied by 860,000 cubic feet of gas per day.

First deep Pennsylvanian crude oil production for the Texas Panhandle sector of the Anadarko basin was discovered during January 1950 in Sherman County. Phillips Petroleum Co., the discovery operator, completed its Willco 1 in Sec. 15, Blk 3-T, T&NORR survey, for an initial potential of 225 barrels of 40° API crude per day on the pump. Casing was perforated opposite a 36-foot section from 5,844 to 5,880 feet.

Willclo 1 is situated two miles south of Phillips' Kathryn 1, a 1949 discovery, which tested gas in the same horizon but at a regionally higher structural position. Both wells encountered gas in the regular 3,000-foot Permian zones which produce in the tri-state Hugoton field. Structure of Willclo is an elongated anticline lying north of, and parallel to, the west-northwest trending Amarillo arch. Key exploratory well on this structure is Phillips' Dix 1, in Sec. 4, Blk 3, GH&H survey, which is situated four miles east of the Willco 1 discovery well in western Hansford County. Phillips owns about 20,000 acres in a nearly-solid block surrounding the discovery well.

First Mississippian oil production for the Texas Panhandle sector was discovered in Roberts County during the spring of 1949. Sinclair Prairie Oil Company's Charles Lips 1 was completed in the Mississippian as an oil well. However, Sinclair drilled another discovery, one mile northwest of Lips 1, which was completed as a gas-distillate well in the Morrowan series of the Pennsylvanian. This is Lips 2, Tract B, in the SWc NE/4, Sec. 157, Blk 13, T&NORR survey. Originally drilled to a total depth of 9,137 feet, it was plugged back to 8,780 feet and jet-perforated with 216 shots from 8,110 to 8,165 feet in the Morrowan series. Initial gauge was 12,777,000 cubic feet of gas per day through tubing with a flowing surface tubing pressure of 1,800 psi and a shut-in well-head pressure of 2,100 psi. Open flow estimate is 41 million cubic feet per day. A third wildcat, Charles Lips 3, near the center of SE/4 SE/4, Sec. 133, CC&M survey, found the deeper Simpson sand objective dry in drilling to depths below 11,031 feet. It was projected to test the Arbuckle (Ordovician formations).

A third gas well in the Lips field, Roberts County, Texas Panhandle, was completed in March. Sinclair's Lips 4-D, one mile northeast of Lips 1 discovery gas well, was assigned a state potential of 17.5 million cubic feet daily. The open flow rating was 30 million cubic feet. Pennsylvanian pay was perforated at 8,431 to 8,453 feet, and the well was treated with 13,000 gallons acid. The location is 660 feet from the south line, 810 feet from the west line of Sec. 159, Blk 13, T&NORR survey.

Interest in northwestern Oklahoma was drawn as far back as 1930 when Sinclair Oil & Gas Co. completed a gas-distillate discovery well in the Pennsylvanian formations near the town of La Verne in Harper County. Designated as the Stockholm pool, Howell 1, located in the center of SW/4 SW/4, Sec. 14, T 26 N, R 24 W, was completed for an initial test of 15 million cubic feet of gas a day and 50 barrels of distillate from 5,350 to 5,400 feet in a sand correlated with the Cleveland sands. Originally Howell 1 was drilled to a total depth of 8,583 feet, some 1,700 feet in the Mississippian lime, and was plugged back to the Pennsylvanian.

J. M. Huber Corp. drilled a northwest outpost dry hole on this structure during 1947 but logged only 850,000 cubic feet of gas per day in a Pennsylvanian sand. The Heironymous 1, located in Sec. 3, T 26 N, R 24 W, was abandoned at a total depth of 7,007 feet.

Deep Mississippian gas reserves were discovered on April 30, 1945, below the 2,400-2,700-foot principal Permian pays on the east side of the Hugoton field in southwestern Meade County, Kansas. Known as the Adams Ranch gas pool discovery, Stanolind Oil & Gas Company's Adams Ranch 1, in the SWc, Sec. 8, T 35 S, R 30 W, was completed for a calculated open-flow volume of 88 million cubic feet of gas per day. Field tests in November 1945 showed 50 barrels of 70°API gravity distillate per day and a thermal content of 1,056 Btus. Completion was made through casing perforations from 5,850 to 5,890 feet in the Mississippian formations. Originally Adams Ranch 1 was carried to a total depth of 7,921 feet in Arbuckle dolomite topped at 7,704 feet, and was plugged back to 6,127 feet for completion. Exploration method was core drilling which uncovered anticlinal structure in the Cimarron (Permian) anhydrite.

Deeper gas reserves for the extreme western side of the vast Hugoton field were found in the Pennsylvanian system during June of 1948, six miles due east of the town of Richfield in Morton County, southwestern Kansas. Known as the Richfield discovery, Stanolind Oil and Gas Company's Bear 1, in the NWc NW/4 SE/4, Sec. 17, T 32 S, R 40 W, was completed for an open-flow potential of 3.9 million cubic feet of gas per day through casing perforations from 4,990 to 4,998 feet with 48 shots in five-inch liner set at 5,059 feet. Bear 1 was drilled to a total depth of

Table 10 Typical Formation Marker Summary

Northern Rim of Anadarko Basin
Ohio Oil Company's Howell 1
C SW/4 SW/4 Sec. 21, T 20 S, R 15 W
Pratt County, Kansas
Surface Elevation: 2,011 ft. d f.

Formation	Sample Tops (Depth, Feet) Actual	Subsea	Source
Cimarron anhydrite	875	(+1136)	Gulf
Fort Riley Limestone	2,420	(— 409)	Gulf
Base Florence Flint	2,550	(— 539)	Gulf
Wreford Limestone	2,630	(— 619)	Gulf
Cottonwood Limestone	2,850	(— 839)	Gulf
Neva Limestone	2,900	(— 889)	Gulf
Lansing Limestone	4,128	(—2,117)	Ohio Oil
Cherty conglomerate	4,608	(—2,597)	Ohio Oil
Kinderhook Shale	4,655	(—2,644)	Ohio Oil
Viola Limestone	4,675	(—2,664)	Ohio Oil
Simpson Formation	4,805	(—2,794)	Ohio Oil
Arbuckle Limestone	4,902	(—2,891)	Ohio Oil
Total Depth	4,929	(—2,918)	Ohio Oil

6561 feet (—3,323 feet) in Arbuckle dolomite topped at 6,505 feet (—3,267).

Kismet oil field discovery was completed also during June of 1948 in the Hugoton embayment, 18 miles northeast of the town of Liberal in eastern Seward County, 11 miles north of the Oklahoma state boundary line. Marmaton series of the Pennsylvanian, logged 452 feet above the Morrow sand, was proven productive from 5,095 to 5,100 feet through final casing perforations in Stanolind's Wheatley 1. Location is in the center of NE/4 SW/4, Sec. 23, T 33 S, R 31 W. Wheatley 1 was drilled to a total depth of 7,340 feet (—4,591 feet) in Arbuckle dolomite topped at 7,119 feet (—4,370 feet) with a small showing of oil. Potential was 130 barrels of oil and 88 barrels of water per day on the pump.

Southeast Keyes pool in Cimarron County in the Oklahoma Panhandle was discovered by Bay Petroleum Corp. during August 1949. Frank Parkes 1, in NEc NE/4 SW/4, Sec. 34, T 4 N, R 8 ECM, flowed 52 barrels of oil per day from 4,765 to 4,819 feet from the "Keyes" sand (local) of the Pennsylvanian rocks. Originally this well was drilled to a total depth of 4,843 feet.

First confirmation test for this field was completed in October 1949 by the same interests was Frank Parkes 2, in NEc SW/4 SW/4, Sec. 34, a 40-acre diagonally-southwest offset to the discovery well. Parkes 2 flowed an estimated five million cubic feet of gas per day in the "Keyes" sand topped at 4,806 feet. However, it was originally drilled to a total depth of 4,924 feet, 10 feet in the Mississippian lime.

Deeper gas reservoir discovery for the west flank of the Chickasha gas field of Grady County was recorded during February 1950. Phillips Petroleum Company's J. B. Nichols et/al's 1, located in the center of NE/4 NE/4, Sec. 3, T 4 N, R 8 W, showed gas in 32 minutes during a one-hour drillstem test from 9,683 to 9,721 feet using a 1,500-foot water load. Recovery in drill pipe was 360 feet of load water, 690 feet of slightly gas-cut water, 90 feet of muddy water and 240 feet of mud. Pennsylvanian formations logged in this test include:

Formation	Depth (Feet) Actual	Subsea
Oolitic	3,792	(—2,593)
Charleston	5,708	(—4,509)
Pooler	6,192	(—4,993)
Mercer	6,638	(—5,439)

Table 11 Typical Formation Marker Summary

Elk City Field, Beckham and Washita Counties, Oklahoma Data: Shell Oil Company, Oklahoma City, Oklahoma.

Age	Formation	Sample Tops (Feet) Actual	Subsea
In Perm.	Base Blaine Formation	1,600	(+ 300)
	Top Wellington Formation	3,600	(—1,700)
	Top Pontotoc Conglomerate	4,700	(—2,800)
Top Penn.	Top Missouri (Hoxbar) Series	7,900	(—6,000)
	Top Belle City Limestone	8,800	(—6,900)
	Top Des Moines Series	10,400	(—8,500)

Note: Maximum depth reached in any well drilled at Elk City field proper, Union Producing Company's Music 1, C NE/4 SW/4 Sec. 24, T. 10 N., R. 21 W.

Nichols 1 was testing above 10,150 feet at this writing in search of deeper productive reservoirs. The well lies on the extreme west edge of the field. Four shallower gas wells completed on this lease are now exhausted.

Deepest oil-producing area in the Anadarko basin at this writing is the Mainka area of eastern Grady County, Oklahoma. The discovery well is Gulf Oil Corporation's Mainka 1, located in the NWc NW/4 NE/4, Sec. 12, T 5 N, R 5 W. Bromide sandstones in the Simpson series were perforated from 13,137 to 13,250 feet. On initial completion on Nov. 23, 1948, Mainka 1 made 464 barrels of oil and 10 million cubic feet per day. However, it was recompleted in January 1949 and is perforated opposite the Bromide and the overlying Tulip Creek sandstone members of the Simpson from 12,855 to 13,611 feet, for 1,068 barrels of oil per day through a 13/64-inch choke.

Structure of the Anadarko geosyncline has been described by Roth (Bull. Geol. Soc. Amer., Vol. 60, 1949) and others. The geosyncline is a major feature of the western interior province. It covers Oklahoma, the panhandle areas of Texas and Oklahoma and portions of southwestern Kansas and southeastern Colorado. Eastern boundary is formed by the north-south trending Nemaha axis on which it located the truncated Oklahoma City uplift. The western rim of the geosyncline lies west of the Apishapa axis in the Oklahoma Panhandle. To the north the basin rises onto the central Kansas uplift, which forms a major positive area between the Harper and Salina basins on the east and the broad Hugoton embayment to the west. This arm, termed Hugoton embayment by Maher and Collins, forms the broad northwest limb through which the geosyncline extends to its northwestern margin, the Sierra Grande arch of eastern Colorado.

Major axis of the Anadarko basin lies in a northwest to southeast direction extending north of, and generally parallel to, the Amarillo axis and the Wichita Mountains. Near this southwest margin the stratigraphic dip approaches 45 degrees, and a number of en-echelon, compression faults are believed to parallel the Amarillo axis. More than 20,000 feet of Paleozoic sediments are represented near the deeper portions of the trough along the north boundary of the Wichita Mountains. See Figure 3, Present Attitude of the Basement Complex.

Table 12 Reservoir Statistics

Hoxbar Reservoir, Elk City Oil Field Beckham and Washita Counties, Oklahoma (Type Structure: Elongate anticline.)

1.	Highest producing zone, d. f. measurement	8,800 ft.
2.	Lowest producing zone, d. f. measurement	10,200 ft.
3.	Maximum productive closure, feet	400
4.	Spacing pattern, acres/well	40
5.	Proved developed attributable acreage, acres (March 18, 1950 status)	1,720
6.	Proved undeveloped acreage, acres (March 18, 1950 status)	4,280
7.	Total proved acreage, (March 18, 1950 status)	
8.	Minimum initial static bottom-hole pressure (at —7,000') psig	3,846
9.	Maximum initial static bottom-hole pressure (at —8,200') psig	4,354
10.	Average porosity, Hoxbar reservoir, per cent	17.5
11.	Average permeability, Hoxbar reservoir, millidarcies	200

Velma pool structure in Stephens County, Okla., is typical of the highly-contorted pre-Permian rocks occupying the eastern extremity of the Anadarko basin. A thick mantle of Permian creates a study entirely subsurface in character. Mallory states that the site of Velma pool failed to sink as rapidly as did adjacent portions of the Anadarko geosyncline during Pennsylvanian time. Approximately 5,000 feet of Pennsylvanian sediments, comprising Springer, Dornick Hills, Deese and Hoxbar formations, were laid down, although greater thicknesses were accumulated in lower areas of the basin. At the top of the Springer and the Deese formations are minor unconformities. The principal orogeny occurred at the close of deposition of the Hoxbar beds.

A central area was bulged upward between Velma and West Velma pools. The application of lateral pressure resulted in the formation of close folds. The effect of continued pressure was to create a large secondary fold lying on the east flank of the central structurally-high feature. In turn the secondary structure was closely-folded and thrust upward against the central autochthonous mass.

Base-levelling during Virgil (Pennsylvanian) time was followed by characteristic deposition of red shale on the flanks of the folds with some limestones. Subsequently, Permian deposition brought from 1,000 to 2,000 feet of Wichita-Albany and Pontotoc red beds to mask the highly-disturbed pre-Permian features.

Pre-Cambrian rocks outcrop in the Wichita and Arbuckle Mountains. These are of igneous origin with the exception of small bodies of quartzite. Principal types are gabbro, coarse-grained pink and gray granite, felsite porphyry and anorthsite with intruded dikes of diabase (Tomlinson).

Upper Cambrian Reagan sand crops out in outlying ridges lying on the north and southeast flanks of the Wichita Mountains but in places Reagan is faulted out or covered by unconformable, younger sediments. In the Arbuckles, Reagan sand may be found along the borders of the pre-Cambrian areas. It exhibits an average thickness of about 300 feet.

Arbuckle limestone of upper Cambrian to Lower Ordovician age overlies the Reagan and comprises outlying ridges north of the Wichita Mountains. In the Arbuckles it forms ex-

Table 13 Reservoir Statistics

Manning Sand Reservoir, Ringwood Oil Field Major County, Oklahoma (Type Structure: Stratigraphic Trap in Morrowan (Pennsylvanian) Series.)

1.	Highest productive structural contour, Manning sand, subsea	—5,413 ft.
2.	Lowest productive structure contour, Manning sand, subsea	—5,550 ft.
3.	Present productive relief, Manning sand, feet	137 ft.
4.	Average producing depth, derrick-floor measurement, feet	6,782 ft.
5.	Average effective pay section, (feet) (from 15 wells)	23
6.	Spacing pattern, acres/well	40
7.	Proven developed attributable acreage	1,720
8.	Proven undeveloped acreage	6,280
9.	Total present proven acreage, (Feb. 20, 1950)	8,000
10.	Number of producing oil wells, (Feb. 20, 1950)	43
11.	Average produced oil gravity, degrees A. P. I.	42
12.	Average porosity, per cent	14
13.	Average permeability, (millidarcies) (from 6 wells)	10
14.	Average connate water, per cent	22

tensive plateaus. Maximum thickness of Arbuckle formation is about 8,000 feet. The lowermost 2,400 feet comprise dolomite with some limestones, dolomitic marble and thin shale members. The upper 5,600 feet is principally limestone which may vary from thinbedded to massive with thin shaly layers. Important sandstone members may be found locally in the topmost layers of the Arbuckle.

Simpson series is of lower and middle Ordovician age. Division by C. E. Decker into five formations are in ascending geologic order: Joins, Oil Creek, McLish, Tulip Creek and Bromide. These formations represent five cyclotherms featured by a basal sand or conglomerate (with the exception of the Joins) and an upper green shale, lime or dolomite member. In the Wichita Mountain uplift only the Bromide crops out, where it is confined to the slopes of two Viola lime hills on the northwest edge of the main range. All five formations crop out in the Criner Hills in the Ardmore basin and along the western and central portions of the Arbuckle Mountains. However, the Joins and Tulip Creek formations thin and disappear in the eastern and northeastern portions. Maximum recorded thickness is about 2,300 feet. Major reservoirs producing in the Simpson along the eastern margin of the Anadarko basin include the McLish, Bromide, and to a lesser extent, the Tulip Creek.

Viola limestone of upper Ordovician age forms characteristic bare, rounded, limestone hills where it is exposed in the Arbuckle Mountains. This same topographic expression may be seen in the Criner Hills and in isolated hills along the western edge of the main range of the Wichita Mountains. Maximum thickness of Viola in the Arbuckle Mountains is 600 feet. Division is made into two members, a lower Trenton limestone and an upper Fernvale member. Viola limestone reservoirs produce oil along the north flank of the Arbuckle uplift in faulted anticlines, horsts and grabens.

Maquoketa dolomitic limestone facies of the Sylvan shale produce gas in the Skinner Ranch field of Barber County, Kansas, along the north flank of the Anadarko basin. Geologic correlation from paleontologic data suggests Richmond series of early Silurian age. The Maquoketa is a porous, brown crystalline dolomite, and its identity is made complicated due to the fact that both the overlying Hunton and the underlying Viola limestones are highly dolomitized. Maquoketa also produces in the Lindsborg field of McPherson County in central Kansas and may comprise an important stratigraphic objective both in Barber County, Kansas, and in the adjoining tier of counties in northwestern Oklahoma.

Sylvan shale of the Medinan series of the Silurian system weathers into narrow, elongated wooded valleys in the Arbuckle Mountains. Lithology is gray-green pyritic shale grading to darker, dolomitic shales near the base. Its average thickness along the rims of the Anadarko basin is 150 feet but varies from 60 to 300 feet. Sylvan overlies the Viola limestones and is overlain by the Hunton series.

Hunton formation is divided by Chester A. Reeds into four formations, as follows:

Chimneyhill: An upper crinoidal member, 15 feet thick; a middle glauconitic member 15 feet thick; and a lower oolitic member, five feet thick. Age: Clinton and Brassfield (Early Silurian).

Henryhouse: Soft, marly limestones, and gray to yellowish drab shales, average thickness 90 feet. Age: Middle Silurian.

Haragan: Soft, marly shale, gray to drab with interbedded marly limestones grading into resistant cherty limestone upward. Age: Helderberg (Lower Devonian).

Bois d'Arc: White to gray, crystalline limestone containing thin beds of chert. Missing in western Arbuckles. Average thickness 60 feet. Age: Oriskany (Lower and Middle Devonian).

Chimneyhill and Bois d'Arc reservoirs produce oil and gas along the north flank of the Arbuckles under both structural and stratigraphic conditions. Important accumulations lie along the Nemaha granite ridge marking the eastern rim of the Anadarko basin.

Woodford chert, a correlative of the widespread Chattanooga shale, is regarded by C. L. Cooper as early Mississippian from conodont studies. Its lithology is bituminous, siliceous, pyritic shales with some included chert. Maximum thickness is 600 feet. Woodford is an important datum plane for nearly all of the pre-Mississippian rocks of the Anadarko and Ardmore basins.

The northern rim of the Anadarko basin received an important discovery well during April at a rank wildcat test located two miles north of Jetmore in Hodgeman County in southwestern Kansas. Shell Oil Company's Springer 1, in the SEc SW/4 SW/4, Sec. 24, T 22 S, R 24 W, topped the Basal Pennsylvanian Conglomerate at 4,569 feet (—2,186 feet) and at 4,584 feet ran a 45-minute drillstem test with packer set at 4,559 feet. Recovery was 1,100 feet of gas, 2,250 feet of 39-gravity oil and 30 feet of oil-cut mud. Shut-in bottom-hole pressure was 1,400 psig.

Mississippian reservoir was topped at 4,594 feet (—2,311 feet). On a 30-minute drillstem test run at 4,649 feet with packer set at 4,599 feet, the recovery was 60 feet of oil and 160 feet of heavily oil-cut mud. Shut-in bottom-hole pressure was 1,400 psig.

Springer 1 was taken to a total depth of 5,148 feet in Arbuckle dolomite topped at 5,073 feet (—2,790 feet). Since salt water was recovered in the Arbuckle, the well was plugged back and five-inch pipe run to 5,007 feet. Both the Basal Pennsylvanian Conglomerate and Mississippian reservoirs will be gun-perforated for completion. The well was drilled with Shell tools.

Meanwhile, Shell has stepped up its southwestern Kansas exploratory operations and has staked location for another rank wildcat 43 miles west and northwest of its Hodgeman County potential discovery well. In northern Finney County stakes were driven for its Case 1, in the NEc SE/4 NW/4, Sec. 7, T 21 S, R 30 W. It is situated on a block of more than 50,000 acres assembled by Shell on reflection seismograph structure. Company tools will be used. The wildcat lies 20 miles east of the Nunn (Mississippian lime) pool of Finney County and 18 miles southeast of the Shallow Water Marmaton (Mississippian limestone) field of Scott County.

Acknowledgement

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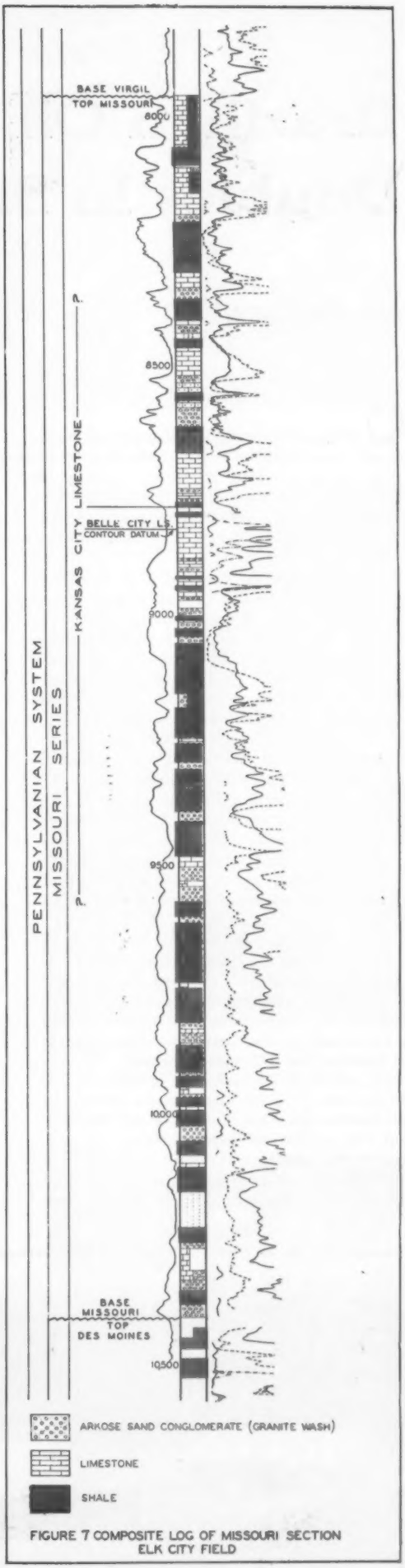


FIGURE 7 COMPOSITE LOG OF MISSOURI SECTION ELK CITY FIELD

Brazilian Oil Consumption Doubles In Six Years

By R. G. WALKER

CONSUMPTION of petroleum products in Brazil approximated 24,400,000 barrels in 1949 compared with 22,200,000 barrels in 1948, according to figures of the National Petroleum Council. The 1949 figures are based on records for the first eleven months with December estimated.

Since the close of World War II Brazilian consumption of oil has been increasing at an accelerated pace. Recently demand has been doubling about once every six years. Before the war the rate of increase was less than five percent yearly. In 1930 imports were six million barrels and in 1937 this had increased 38 percent to 8.2 million barrels.

During the war supplies decreased. Gasoline was rationed, the admixture of alcohol with gasoline was made obligatory, and the use of private cars, unless equipped with gas generators, was prohibited. Long queues of commercial vehicles and taxis lined up overnight before service stations on the days appointed for distribution, and many activities were partially interrupted owing to lack of fuel.

Once the war was over and the shipping situation eased, supplies from abroad increased progressively. The government found it possible to suspend rationing, and private cars again returned to the roads. In the three years between 1944 and 1947 imports of gasoline rose 207 percent, kerosene 114 percent, fuel oil 344 percent and lubricating oils 26 percent. The use of alcohol as motor fuel declined as gasoline became more plentiful, but 364,000 barrels were consumed in gasoline-alcohol mixtures in 1948. Between 1940 and 1946 alcohol consumption was reduced 63 percent. A further drop of 44 percent from the 1946 record was shown in 1948, although blending still was obligatory.

Despite a determined search, the government of Brazil still has not developed a significant domestic production of petroleum. Average output of Brazilian wells in the past two years has been about 300 barrels daily. Local refineries process this crude plus about 700 barrels daily of imported crude. The three skimming plants in Rio Grande do Sul and San Paulo in 1948 produced 5.3 million gallons of gasoline, 1.2 million gallons of kerosene, 11.2 million gallons of fuel and diesel oil and 114,000 gallons of lubricants.

The detailed figures of consumption, in barrels, of petroleum products in Brazil during 1948, as quoted by the National Petroleum Council, are as follows: aviation gasoline, one million; motor gasoline, 8.1 million; kerosene, 1.3 million; diesel oil, 3.04 million; fuel oil, 7.9 million; lubricating oil, 484,000 barrels; alcohol, which was mixed with gasoline, 368,000 barrels.

Detailed figures for the whole of 1949 are not yet available, but consumption during the first eleven months of the year, in barrels, was as follows: gasoline, 10 million; aviation gasoline, one million; solvents, 100,000; kerosene, 1.5 million; all residual fuels, 8.4 million; lubricating products, 570,000; miscellaneous, 34,000; total 21,694,000. On this basis consumption for the year may be estimated at 24.4 million barrels, an increase of 10 percent over 1948.

The consumption of gasoline and fuel oil in Brazil amounts to only 8.2 and 7.3 gallons per capita, but consumption is doubling every six years. A further substantial increase is expected during 1950 in spite of foreign trade control, instituted in 1948 and tightened up at the end of 1949, in order to confine imports within the limits of available exchange. Liquid fuels are replacing coal on the railways and in industry, and throughout Brazil local authorities are cooperating with the National Highway Department in building and repairing roads. All populous centers are being connected to arterial highways, and trucks can now travel from the southern frontier to Rio de Janeiro and thence to Pararaiba in the north. In the near future they will be able to continue to Belem, Para. The new paved highway between Rio de Janeiro and San Paulo, eliminating sharp curves and steep gradients, will shorten the distance by 90 miles. Road traffic is, therefore, growing rapidly, and by the middle of 1949 there were 395,405 motor vehicles in service, compared with about 340,000 at the end of 1948. Bus traffic is increasing in all urban and rural districts. Over 12,000 omnibuses were registered in 1949, in addition to the numerous trucks performing passenger transport services in outlying districts. In Rio de Janeiro half of the omnibuses now use diesel oil.

Factories in Rio de Janeiro, San Paulo and Minas Geraes are building chassis for commercial vehicles; the National Motor Factory aims to turn out monthly 100 trucks complete with 100-hp diesel motors, and the first tank trucks built by the national works were seen on the streets of Rio de Janeiro at the end of the year. Approximately 1,200,000 tires were produced in Brazil in 1949.

On the railways diesel motors are replacing coal and wood-burning engines on difficult or busy sections; animal traction is being supplanted by motor trucks on the plantations,

Standard Oil Co. of Brazil bulk plant at Belo-Horizonte which serves the State of Minas Gerais, one of the richest and most progressive states in Brazil.

Modern gasoline service station of Atlantic Refining Co. in Rio de Janeiro. The station has two pump islands and five lubrication and working bays.

Part of Atlantic Refining Company's bulk distributing and storage plant at Porto Alegre, Rio Grande do Sul, showing fleet of tank and stake trucks.

and work on the farms is being mechanized as fast as equipment can be imported. Aviation, which is destined to play a great role in Brazil owing to the immense distances and topographical difficulties, continues to make great strides. Eight international lines are maintaining eighteen weekly services to Europe and the United States, and air transport agreements have recently been signed with two other nations. More than twenty national companies are carrying out regular trips over national territory in all directions, and two new subsidized lines were authorized at the end of 1949. The prospects of increased consumption of petroleum products in 1950 are thus assured.

At the beginning of 1949 there were registered 197 firms as importers and distributors to supply the Brazilian market with petroleum; 61 others were authorized to distribute only, and 124 were licensed to import for their own services. The principal countries supplying petroleum products to Brazil are the United States, Dutch West Indies, Trinidad, Venezuela and Peru. The chief ports of entry are Rio de Janeiro, Santos, Recife, Rio Grande do Sul, Salvador and Belem.

Brazil's tank equipment for transporting and distributing petroleum and its products in bulk consists of nine small ships, with a total carrying capacity of 284,065 barrels; 52 lighters able to carry 67,375 barrels; 263 trucks to transport 79,000 barrels; and 1,037 railway wagons with a carrying capacity of 200,000 barrels. At the end of the year arrangements were concluded for the purchase by the government of 10 ships for 123,750-barrel capacity, six to be acquired in Sweden and four in Great Britain, and 19 shallow-draft vessels of 15,000-barrel capacity, to be built in Japan.

The Brazilian market for petroleum products is mainly divided among the following oil firms in the proportions indicated: Standard Oil Co. of Brazil, 39 percent; Atlantic Refining Co. of Brazil, 26 percent; Shell-Mex of Brazil, 17 percent; Texas Co. of South America, 14 percent; and Gulf Oil Co., four percent.

Gasoline, kerosene, diesel, fuel and lubricating oils are imported in bulk in ships owned or chartered by the companies and landed at Belem, Fortaleza, Recife, Salvador, Rio, Santos, Paranagua and Rio Grande do Sul. Bulk transshipments are made from Rio Grande do Sul in small lake steamers to Porto Alegre, and from other ports by rail in tank cars to Campina Grande, Belo Horizonte, Cruzeiro, Juiz de Fora, San Paulo, Campinas, Araraquara, Bauru, Ourinhos, Uberlandia, Santa Maria and other interior cities. A pipeline is planned from Santos to San Paulo to reduce congestion on the Santos-Jundiai Railway, which carries over one million tons of petroleum products annually. It will be built by the railroad, and will be extended later to Campinas, another big consuming center. Branch lines will carry products from the trunks to distributing companies and refineries within six miles on either side. The new state-owned refinery for 45,000 barrels daily and the private refinery for 20,000 barrels will be located within the area fed by the line.

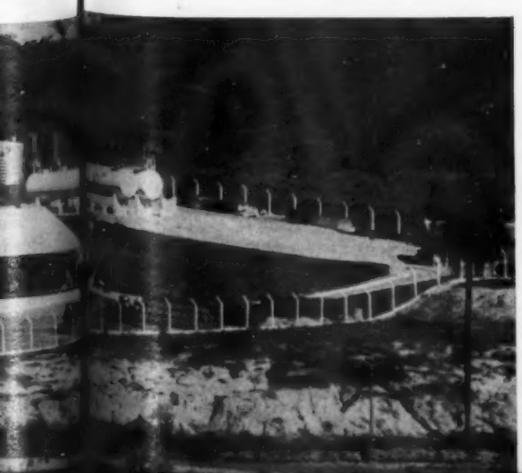
From the secondary distributing points mentioned above, from which bulk transshipments are made, products are carried to other inland points by tank trucks, where these are available, or loaded in drums for ordinary truck or rail transportation.

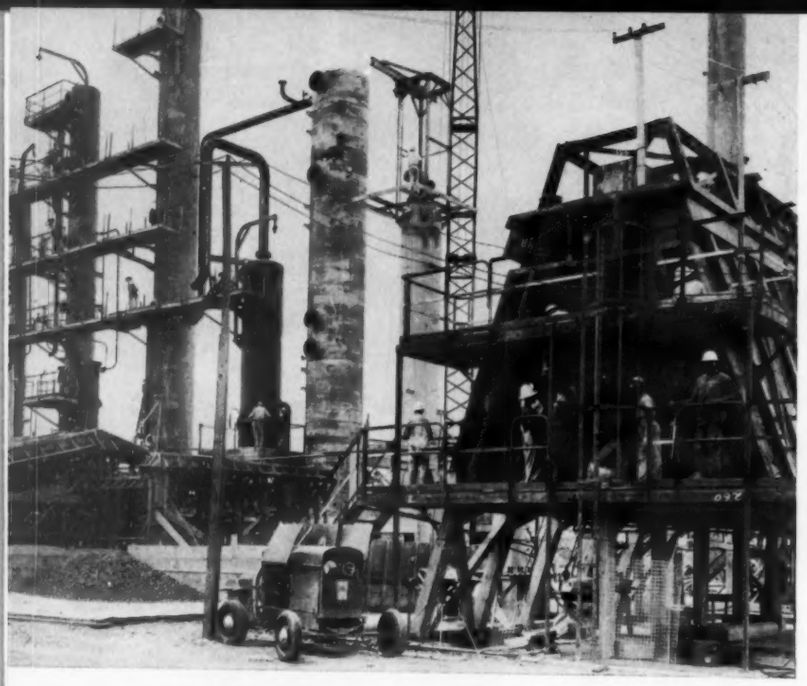
Casing and canning plants exist at most of the landing ports, while plants for drumming lubricating oils are installed at Rio de Janeiro and San Paulo. The cases are usually made by the companies from Parana pine, supplied in suitable lengths and thicknesses. Tins are made by a number of local factories, and drums are now obtainable in adequate quantities in Brazil.

Industrial oils and other high-grade lubricating oils are sold directly to consumers.

Latest well to be completed on the island of Itaparica where a 200-acre field with a 3.5 million barrel reserve is being developed.

Aerial view of part of the Shell-Mex bulk plant at Ypiranga, San Paulo.





Construction work in progress at the 2,-500-barrel refinery at Mataripe, Brazil.

Some diesel oil is also sold directly to large consumers, including ships, being transferred directly from the tanks to the bunkers, wherever possible, through pipes laid alongside the quays. On the new quay now building at the Rio de Janeiro port, a length of 1,834 feet will be allotted to the handling of petroleum products. It will be divided into five sections for the use of the principal companies. Aviation gasoline and oils are usually sold direct to large consumers. Lower class lubricating oils are sold to jobbers, who re-brand and sell for consumption.

The greater part of the oil companies' sales are made through dealers who operate service stations, garages and stores throughout the country. In eleven months last year 32 licenses to build filling stations were issued in San Paulo. The big companies have at least one dealer in every city, town and village, and in nearly every hamlet of Brazil. In such cities as Rio de Janeiro and San Paulo there are as many as 2,000 of these dealers.

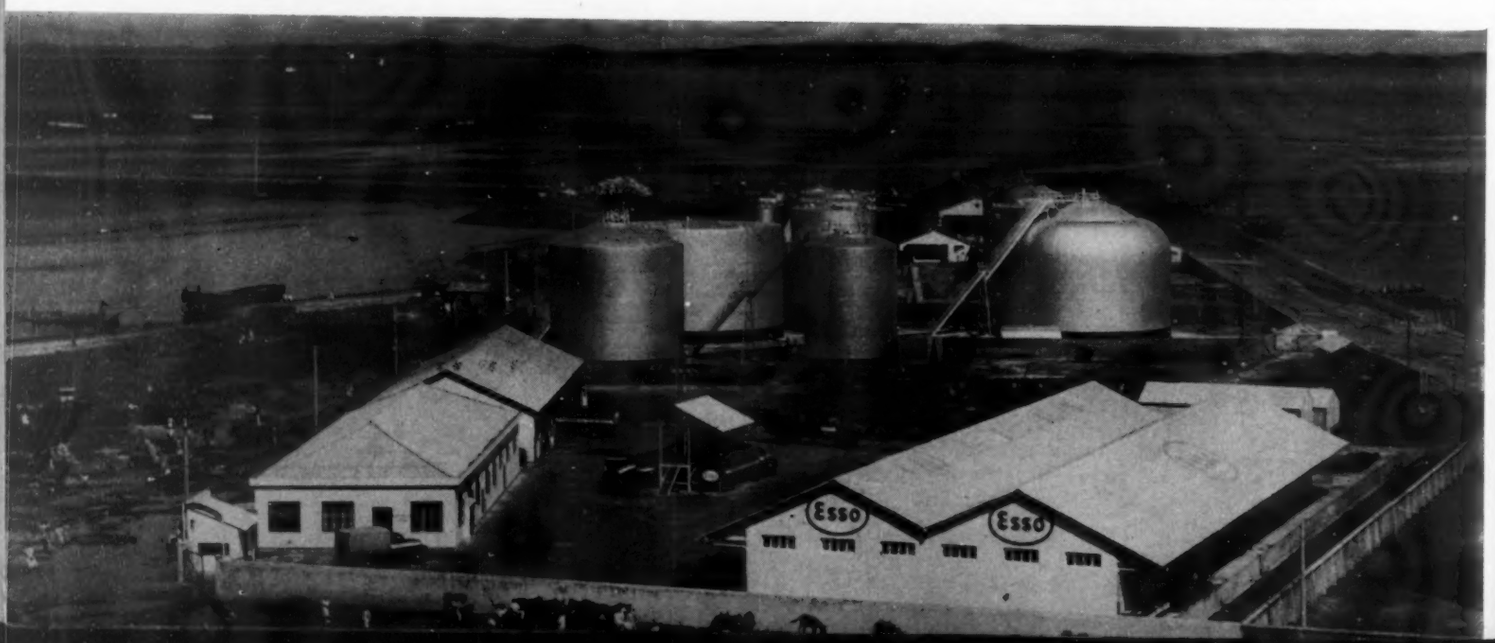
Prices are fixed by the National Petroleum Council for each supply base, in accordance with the fob cost, plus delivery to destination. The prices for ordinary gasoline, kerosene and diesel oil were revised at the end of the year, the price per liter in the federal capital and San Paulo being altered to 1.79, 1.19 and 0.69 cruzeiros respectively. At the official rate of exchange the San Paulo gasoline price was 39.2 U. S. cents per gallon at the end of 1949; kerosene, 24.3 cents, and diesel fuel 14.2 cents.

The National Petroleum Council has approved a new scale of selling prices for fuel oil at the various supply bases in Brazil. Prices now range from $23.10 U.S. per ton at Recife to $34.48 at Porto Alegre, representing a reduction of from $1.04 to $1.21 per ton on the former charges.

New kerosene prices also came into force in April. The price per case of 37.85 litres now varies from $4.07 U.S. at Belem, Para, to $5.41 at Fortaleza.

During 1949 successive reductions brought down the cost in Brazil of fuel oil per ton by $10.39 U.S. at Porto Alegre and $6.87 at the main supply bases from San Paulo to Recife. Similarly, the cost of diesel oil was progressively reduced by $4.40 per ton during 1949 at the principal distributing centers.

azilian officials inspecting the tanker Presidente Dutra, first of a fleet of ten tankers being purchased to supply Brazilian oil needs.



Ocean terminal built last year at Salvador, Bahia, for Bahia Dock Co. Standard Oil Co. of Brazil, financed and erected the plant.

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Oil Progress In Yugoslavia

Exploration and Development Activity Increase as Domestic Plants Produce Drilling Rigs to Supplement Foreign Equipment Purchases. Capacity of Refineries Is Being Increased to Supply Growing Demands of Railroads and Road Vehicles.

By E. A. BELL

ALTHOUGH reliable oil news from Yugoslavia is still scarce and erratic, it is possible, on the basis of laconic official reports issued from Belgrade every now and again, and with a knowledge of the general conditions obtaining in the oil industry, to form a fairly complete picture of the Yugoslav oil position. In this connection an official statement from Belgrade that the output of crude oil in Yugoslavia during 1949 had totaled 340,000 metric tons proved invaluable. That result, the Yugoslav Federal Planning Commission stressed, was the equivalent of 100.8 per cent of the target figure set for 1949.

Seen against the background of the 450,000-metric-ton target figure for 1951, the last year of the 1947-1951 Five-Year Plan, the achievement reached in 1949 represented 75.5 percent of the 1951 plan. In a recent speech given at Belgrade, Boris Kidric, chairman of the Yugoslav Federal Planning Commission, emphasized that the target for 1950, as far as the output of crude oil was concerned, was to surpass considerably the 1949 result, the aim being 91.3 percent of the total earmarked for 1951. In other words, the target figure for 1950 would be 410,850 metric tons.

The figures as outlined above point to sustained and successful efforts which have led to results far outstripping those attained in prewar times. In 1939, for instance, the output of crude in Yugoslavia, almost entirely from the Donja Lendava oil area in northeasternmost Slovenia, about 14 miles due north of the frontier town of Cakovec and close to the Hungarian border, aggregated only 1,000 metric tons. The present five-year plan aims, therefore, at an increase in the output of crude oil by nothing less than 45,000 percent. The results attained by the end of 1949 means that an increase of 34,000 percent has already been reached.

The efforts to increase production must have been remarkable during the past year, for the particulars disclosed by the Yugoslav Federal Planning Commission early in January 1950 pointed to an increase of 135.5 percent in the output of crude oil and refined products in Yugoslavia attained between 1948 and 1949. Marshal Tito, in his speech held at Pula on July 10, 1949, had already made reference to this considerable expansion when he said that the output in the country's oil sector during the first half of 1949 exceeded that for the same months of the previous year by 135 percent.

This conspicuous expansion was in part the outcome of a considerably intensified exploitation of the Donja Lendava fields referred to above, and in part the result of the notable development of the Goilo workings in northern Croatia, to the southeast of Zagreb. The Goilo oil fields extend roughly from Kutina, some 49 miles to the southeast of Zagreb, on the Belgrade-Zagreb main railway line, northward in the direction of Bjelovar town, about 30 miles as the crow flies, and northeastwards in the direction of Daruvar town, again some 30 miles from Bjelovar.

The presence of the Golio oil deposits was known before the war, although their magnitude was an unknown factor then. A scheme for their exploration and eventual exploitation, evolved before 1939, was not proceeded with, but priority was given to the development of the gas wells in the Kutina area and in the adjoining Bujavica region. Natural gas was obtained there in commercial quantities and is used locally for industrial purposes as well as for the operation of motor vehicles in the regions concerned and at Zagreb. The gas is also being used for lighting railway coaches.

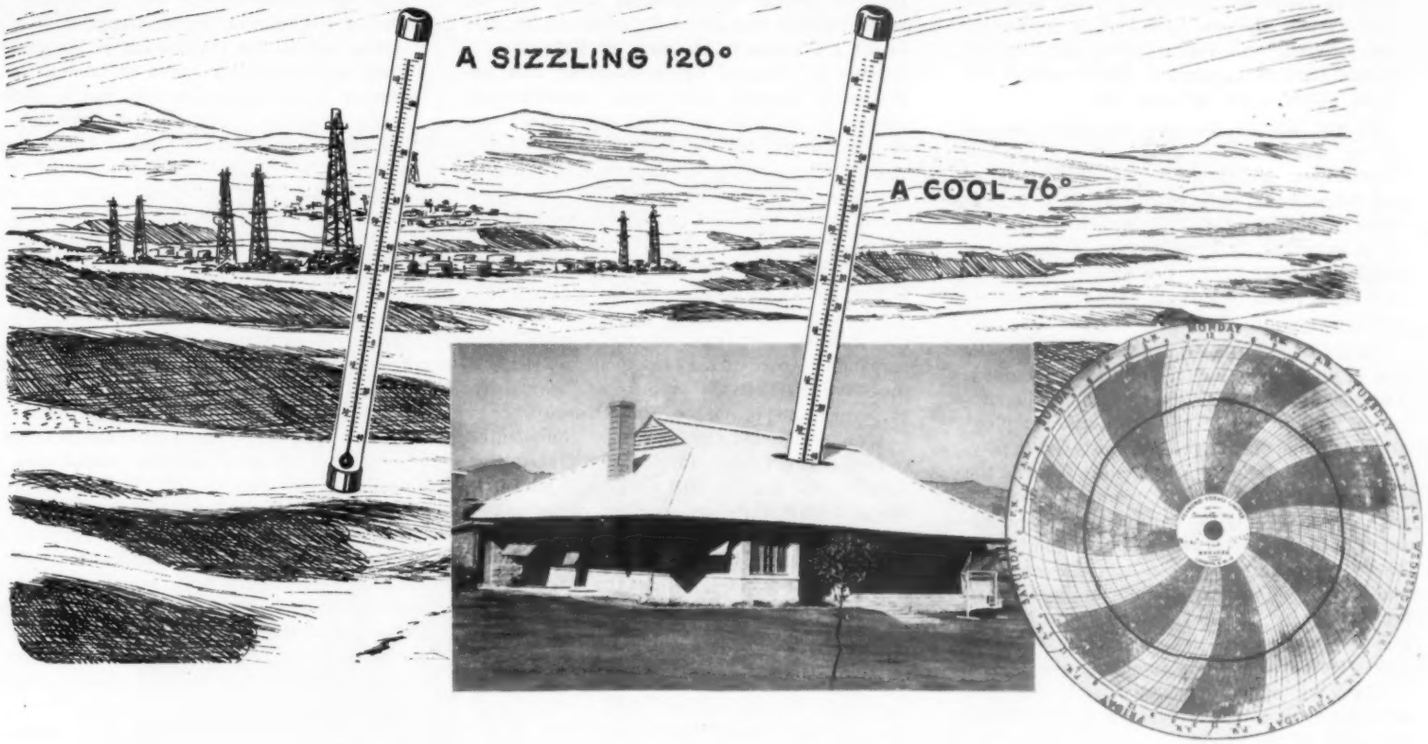
The development of the Goilo region was taken in hand soon after the war. The Goilo area proper is located north of the Sava River and west of the mouth of the Pakrac River. It was described in WORLD PETROLEUM in October 1948 as one of the most promising known oil areas in Yugoslavia, the development of which was to be given precedence. It reaches south as far as Kutina and to the north as far as the Moslavacka hill range and the Goilo Mountain. To the west its border is marked by the Mikleuska village. It may easily be located in the sketch map published in the issue of WORLD PETROLEUM referred to above.

In all probability, the combined output of Donja Lendava and Goilo regions covers most of the crude oil at present produced in Yugoslavia, at least as far as the commercially justifiable production is concerned. Prospecting, however, and test drilling are at present being carried out in the most disparate regions of the country where geological conditions warrant. These are the regions of Kakanj, some 30 miles to the north of Sarajevo, of Tuzla and Kreka, about two miles west of Tuzla, in northeastern Bosnia, due north of Sarajevo.

Another oil-bearing area now under close scrutiny is located in eastern Serbia between the town of Nish and the Danube. Early in the current year, official news from Belgrade disclosed the discovery made sometime in 1949, of an oil zone in Vojvodina, the autonomous region in the Serbian popular republic, located between Belgrade and the frontiers with Romania and Hungary in the north. Later an official report, originating from Bar, Montenegro's main seaport, said that preliminary work was in progress near Kodre, in the vicinity of Ulcinj, Yugoslavia's southernmost port in the Adriatic close to the Albanian frontier. Details covering the assembly of drilling rigs and derricks in the Montenegrin coastal zone concerned were made public in February. Reports of exploratory activities and of test drilling for oil have come also from coastal areas in Dalmatia, and from various other places in Bosnia. It is worth while to record in this connection that an official statement set 1949 drilling at double the figure reached in 1948.

Efforts to locate new oil deposits and endeavors to increase production in oil areas already in exploitation have been seriously handicapped by shortage of drilling rigs and other oil field equipment. Before the war drilling rigs for the Donja Lendava fields were all imported from abroad. No oil field equipment was then manufactured in Yugoslavia.

The prewar Lendava fields were foreign-owned and foreign-worked. Their owners, Medjimursko Petrolejstvo Drustvo, went through various vicissitudes during the war. The Germans secured a majority interest first, but later the concern passed into Italian hands, and the Italian, state-controlled



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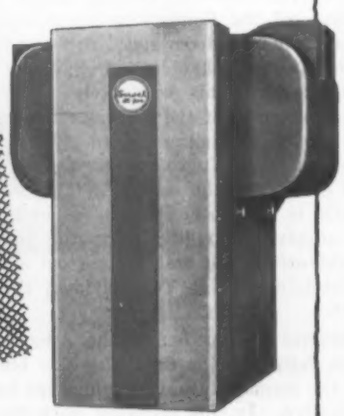

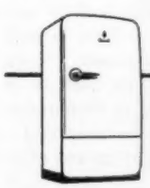

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Azienda Generale Italiana Petroli took the lead. After the war the Italian connection was severed, and the concern, nationalized, became part of Jugopetrol, the Yugoslav National Concern for Mineral Oil.

By the end of the war the Germans had played havoc with Lendava fields. Those installations which could not be dismantled and taken away were ruthlessly destroyed or devastated. The whole documentation as to oil prospecting, drilling, output, refining and other oil activities in Yugoslavia is said to have been taken to Hungary when the general collapse came in May 1945.

Owing to the impossibility early after the war of producing oil equipment in the country, Yugoslavia was compelled to entrust the supply of drilling rigs and other oil field plant and machinery to Czechoslovakia, Hungary, Poland and the Soviet Union within the framework of the trade agreement concluded with these countries industrially more advanced than Yugoslavia was at the time. These trade agreements dated between 1945 and 1948. According to official particulars from Belgrade, the Soviet Union was to supply 25 complete oil field installations up to 1950. Only five plants actually were delivered in January and February 1948. All five were far from complete, lacking their derricks and most of the piping.

The same reports stressed the fact that Poland did not supply a single unit, while Hungary delivered only 4 percent of the piping due under a reparation agreement. Supplies from Czechoslovakia were more substantial though equally unsatisfactory. The Czechoslovak National Undertaking, "Zavodi Sokolovo," the former Ceskomoravska-Kolben-Danek concern, supplied six complete units up to the middle of 1948. It appears, however, according to the same Yugoslav source, that a number of 160-hp diesel engines belonging to those units, which were installed in the Goilo fields, were out of working order in less than 24 hours after the operations had started. Similar failures were experienced in the case of a number of 220-hp diesel engines of the power units supplied by Skoda of Plzen.

Drill pipe manufactured and supplied by the Czechoslovak State Iron Works at Vitkovice, for which a working pressure of 2,500 psi (175.8 kg. per sq. cm.) had been specified, showed critical deformations at depths of 2,295 to 2,625 feet with a working pressure varying between 711 to 853 psi (50 to 60 kg per sq. cm.).

The rift between Yugoslavia, on the one hand, and the Cominform countries, on the other, which had developed in June 1948, resulted in the withholding of equipment by the Cominform. This was likely to jeopardize the realization of the Yugoslav five-year plan so far as oil was concerned. This was the position when Yugoslavia was given a helping hand from the west. At first the United States is said to have been somewhat averse to supplying drilling rigs to Yugoslavia. Nevertheless, the first units from across the Atlantic arrived in Yugoslavia by the end of 1948.

Several months before the American rigs were delivered, the first Yugoslav blueprints for the manufacture of drilling rigs had been completed. In this planning work the Djuro Djakovic works of Slavonski Brod (on the main railway line from Belgrade to Zagreb, about 137 miles to the west of Belgrade), a locomotive, wagon, bridge-building and engineering works, had been instrumental, thanks to its wide technical experience; and in the autumn of 1948 the firm was entrusted with an order for five complete sets. These, the first drilling rigs manufactured in Yugoslavia, were delivered by September 1949.

Five more sets of the same type, also produced by the Slavonski Brod works, were completed early in 1950. Actually these ten units were the products of close collaboration between a number of works, each being responsible for certain components. Thus, the "Ivo Lola Ribar" works, a heavy machine-tool works located at Zheleznik near Belgrade, supplied the heavy and complicated components of the units; the "Jastrebac" foundry and engineering works at Nish made the pumping units and certain other parts; the "Rade Koncar" works of Zagreb (formerly Yugoslav Siemens Co.) contributed the electric motors, etc.; while the "Jedinstvo" works, also of Zagreb, manufactured amongst other components the water tanks, etc. The "Djuro Djakovic" works manufactured amongst other things also the derricks, 137-¾ feet high, as well as the steel platforms of the rigs measuring 753.5 square feet.

The weight of a complete unit was 110 metric tons. The cost price of a complete drilling rig amounted to 12,000,000 Dinars, equivalent to $240,000 U.S. To facilitate and rationalize the further production of drilling rigs and other oil field equipment, it was decided at a later moment to concentrate the whole work in a single place where repairs would also be handled. The works are now building. It has been stated that refining equipment is also to be produced by the new works.

The present demand for oil field installations is not less pressing than before, owing to the large-scale expansion of the oil workings. The trade agreements concluded in 1949 with the United States, Great Britain, France and western Germany, therefore, envisage also the supply of drilling rigs and other oil field plants. In the case of the United States a report circulated in July 1949 pointed to an agreement for the supply of 15 complete drilling rigs and a considerable quantity of piping, etc. Further particulars emphasized that Paul Lowinger, described as an American engineer, had been responsible for the conclusion of that agreement.

Part of the $20-million loan which the United States granted Yugoslavia early in March last has been said to have been earmarked to finance the purchase by Yugoslavia on the American market of drilling rigs and other oil fields installations, while a further part is said to be intended for the purchase of crude oil and derivatives.

As to Great Britain, the five-year trade agreement, concluded with Yugoslavia by Christmas 1949 and operative as from Jan. 1, 1950, covers also the supply of British-made drilling rigs and other oil field installations. Moreover, Great Britain is to supply within the five years under review crude oil and oil derivatives for the amount of £5 million, the equivalent of $1,400 million U.S., or 70,000 million Dinars.

In this connection it may be recalled that during 1949 Great Britain supplied to Yugoslavia, within the framework of the one-year trade agreement concluded at London in December 1948, some 100,000 metric tons of crude from the sterling area (Persia). In September 1948, that is, about three months after the initial phase of the quarrel between Yugoslavia and the Cominform countries when, as a result of that rift, oil supplies to Yugoslavia from Albania, Romania and the Soviet Union had been stopped, a message from Belgrade stressed the necessity of Yugoslavia procuring 19,000 metric tons of crude oil from the Anglo-Iranian Oil Co. Previously Albania alone, the message added, had supplied Yugoslavia with some 120,000 metric tons of crude oil yearly, while the Yugoslav demand for oil products was stated to amount to some 340,000 metric tons annually at that time. As a result of the rapid industrialization of the country and the widening mechanization of her agriculture, her oil requirements have undoubtedly grown rapidly since then. As to supplies of oil field equipment from western Germany, it has been stated that these will constitute the first deliveries of oil machinery western Germany has been permitted by the Allies to export since the war.

The purchase by Yugoslavia of crude oil and products seems to point to the fact that her own production is still insufficient to cover her requirements. The Yugoslav oil refineries have at present a combined throughput capacity exceeding the supply of crude from the country's own oil fields. There is, therefore, convenience in importing crude oil to be refined in Yugoslavia.

The most important refinery in service is that at Rijeka (formerly Fiume). Owned before the war by the Italian Romsa concern (Raffineria Olii Minerali Societa Anonima) and now belonging to Jugopetrol, it is said to have increased its prewar capacity of 850,000 barrels per year to 2.5 million barrels yearly. In August last Italian reports spread the news of the total destruction of that refinery by fire. This proved a fantastic exaggeration. An official statement from Belgrade described the incident as one of the usual fires habitually occurring in oil refineries, and on Nov. 21 last, it was officially announced that the Rijeka refinery had on that day fulfilled its target for 1949 as to the throughput of crude oil. It was, furthermore, added that the refinery had regularly carried out its monthly plans during the year and even increased its output.

Yugoslavia's second important oil refinery is that of Sisak, on the railway line from Zagreb to Novksa, 31 miles to the southeast of Zagreb. Before the war the refinery belonged to the Shell group and had an annual capacity of 600,000 barrels. This is said to have been considerably increased. Located on the Sava river, the refinery used to process at that time a great deal of Romanian oil supplied by Shell-controlled sources and carried up-Danube and up-Sava by means of river tankers.

No particulars are available as yet to a third refinery, located at Sumecani in the neighborhood of the Goilo oil fields about nine miles northeast of the Ivanic Grad (on the

(Please turn to page 59)

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Bermudez Recounts Pemex Progress On Anniversary Of Expropriation

By Douglas Grahame

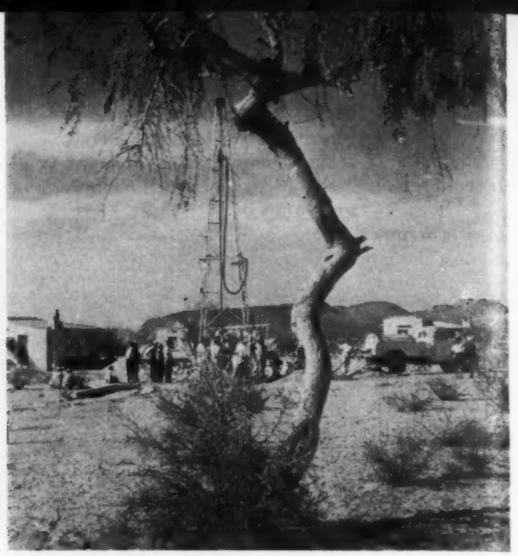

Photo of Mexican drilling operation. Courtesy George E. Failing Supply Co.

ON MARCH 18 Petroleos Mexicanos celebrated the twelfth anniversary of the expropriation of foreign-owned oil properties in Mexico under the decree of former President Lazaro Cardenas. In connection with the celebration, Director General Antonio J. Bermudez told of the progress Pemex has made in the past three years and outlined a nine-point program designed to increase the effectiveness of the national operation.

Recounting recent history, Senator Bermudez said that crude production of 56 million barrels in 1947 had increased to 62 million barrels in 1949. Refinery runs rose from 46.4 million barrels to 50.8 million barrels in the same period. Domestic consumption of petroleum products was 36.8 million barrels in 1947 and 44.6 million barrels in 1949.

Exploratory work was curtailed part of last year from 34 field crews in 1948 to a low of 21. This activity now has been increased again to 31 field parties. Features of 1949 wildcatting were discoveries of the Presidente Aleman field in the Papantla area, Vera Cruz (where the Mexican government is developing a huge irrigation and other waterworks project), and the fields, Francisco Cano y Monterrey in northeastern Mexico, and Fortuna Nacional in Tabasco.

Senator Bermudez spoke glowingly of the contract Pemex made on March 4, 1949, with the American independents. That contract has begun to give results, Senator Bermudez said. These independents, operating in Mexico as the Mexican-American Independent Oil Co., drilled the Tortuguero No. 1 well near Coatzcoalcos (Puerto Mexico, Vera Cruz), "which proved the existence of two producer horizons," and is now drilling Tortuguero No. 2 in the same zone, as well as Xicalango No. 1 in Campeche. Sands with gas at high pressure have been touched in the latter well, he said.

Pemex operated 61 rigs last year in drilling exploration, and exploitation wells and workovers. During the year 24 exploration wells were completed, six in northeastern Mexico, nine in the Tampico belt, three in the Poza Rica field and six on the Isthmus of Tehuantepec. Of the 139 exploitation wells drilled during last year, 96 were producers, with a total potential daily production of 27,424 barrels of oil and 55 million cubic feet of gas. In all 196 wells were drilled, of which 163 were completed and 33 continued to be drilled on Dec. 31. Footage drilled in 1949 totaled 625,000, the highest for any year since 1930. In 1948 footage drilled was 400,000. Last year 53 wells were repaired and 12 plugged.

Oil reserves increased to 1,270 million barrels on Dec. 31, 1949, due to discoveries in El Plan, Alazan, an extension of the Moralillo field southeast of Poza Rica, an extension of Poza Rica, and an extension of Fortuna Nacional. Gas reserves also increased in 1949, chiefly in the Reynosa district, Tamaulipas. These reserves now total 1,180,000 million cubic feet, which equals 236 million barrels of oil and, therefore, brings to 1,506 million barrels Mexico's oil reserves, Senator Bermudez said.

Pemex has been supplementing its railroad transportation of products to domestic consumers with tank trucks. Some of this distribution has been expensive, but it has helped minimize the load on the overtaxed railroads. Pemex now operates 1,765 tank cars compared with 1,561 in 1948. The company moved some 20 million barrels of oil and products by barge and tanker.

The Pemex chief emphasized tax payments his company made to the Mexican government—in 1949—335,397,675 pesos compared with 213,378,049 pesos in 1947. This year January tax payments totaled 31,465,000 pesos, or 1,014,000 pesos daily. February payments were 31,580,000 pesos, or 1,125,000 pesos daily.

The program adopted by Pemex for 1950 contemplates an increase in drilling rigs from the 61 now operating to 75. With this field activity it is hoped that production can be increased to 300,000 barrels daily (this figure to include the oil equivalent of gas produced).

It is planned to complete the work now under way at Poza Rica which will permit a large increase in gas production for delivery to industries in Mexico City. A 5,000-barrel refinery is to be built at Reynosa to serve this new producing field. Gas lines are to be laid between Reynosa (Tamaulipas), Monterrey (Nuevo Leon) and Torreon (Coahuila); and between Brasil, Tampico and Poza Rica, that will connect at the latter point with the present line to Mexico City.

Pemex plans a refinery on the Pacific coast and a lubricants plant. Plants for the efficient capture and use of gas in the northeastern fields are planned. Pemex's sea fleet is to be overhauled at a shipyard to be built at Vera Cruz. New tanks will be erected to increase storage capacity. Distribution is to be enlarged, particularly in the north and along the Pacific coast.

In connection with the 1949 annual report which revealed a net profit of 848,475.94 pesos, Senator Bermudez said: "In the report for the year 1948 we forecast the drop in oil prices on the world market. That reduction became a fact, and in view of production exceeding demand in the consumer countries, we estimated that price levels will not ascend in 1950 and that there is still the possibility of a greater decline."

Carlos Reynoso, Pemex sub-commercial director, in his speech at the first Mexican technical oil convention recently held in Mexico City, at which Senator Bermudez presided, indicated that Mexico for the present would be better off concentrating on the home market instead of striving to increase exports of oil and its by-products in face of world overproduction.

However, it was announced at the convention by Charles B. Carpenter, supervisor of the Oil Fields Office at Dallas, Texas, and Ing. Manuel Rodriguez Aguilar, Pemex exploration manager, that in 1949 Pemex exported 14,125,590.19 barrels valued at 212,809,425.26 pesos, compared with 13,046,985.68 barrels valued at 170,350,362.46 pesos in 1948. Mr. Carpenter and Rodriguez Aguilar remarked that, though much has been said in Mexico and abroad about Pemex's exports dwindling, such is not the case. Exports are high, they said, despite the increasing use of oil and its by-products in Mexico because of expanding industrialization. Since 1938 when Pemex began, exports have totaled nearly 135 million barrels with a total revenue of 993,382,996.57 pesos.

Behind: An eventful decade...

Ahead: Strength to meet the oil needs of free people

STANDARD OIL COMPANY (NEW JERSEY) REPORTS FOR 1949...

THE 215,000 STOCKHOLDERS of Standard Oil Company (New Jersey) have just been sent the Company's 1949 Annual Report. Some highlights are given here.

The report covers the closing year of an eventful decade — a decade of violent action and change . . . of war, and war's results, of great shifts in people's living standards, and in their hopes and aims.

It was a decade which put the strength and adaptability of American business to great new tests. *And proved that the American kind of business enterprise gets jobs done.*

To the oil business, these last ten years brought demands far beyond any past experience.

Standard Oil Company (New Jersey) carried well its full share of this load. More new supplies of oil were found and developed than ever before. With them came more new processes, more new products, more new jobs and job opportunities. We took in more money, and paid out more — for wages, taxes, dividends, supplies — than in any previous decade in history. And in that ten years almost four times the amount paid in dividends was invested in new facilities — strengthening the business to meet war and post-war needs.

Like all sound American business, Jersey Standard got these results through skill, initiative, teamwork and the productive use of capital. Men who work in the business of their choice — free to think and make decisions — took actions which got results and got them in time.

In reporting for 1949, this Company offers its stockholders not just the report of one business year . . . With it comes the hopeful assurance of strength and ability to meet the growing oil needs of free people in free lands.

STANDARD OIL COMPANY (NEW JERSEY)
AND AFFILIATED COMPANIES

HIGHLIGHTS FROM THE 1949 REPORT:

(for the consolidated companies)

PRODUCTION — 957,000 barrels daily total (11% less than 1948)

REFINING — 1,287,000 barrels daily total (7% less than 1948)

SALES — 1,363,000 barrels daily (slightly less than 1948)

RESEARCH — $21,400,000 spent on scientific projects (6 per cent more than in 1948)

CONSOLIDATED NET EARNINGS — $268,870,000 or $8.91 a share. This compares with $365,605,000 or $12.44 a share in 1948. Total income $2,934,686,000 (12 per cent less than 1948)

PARENT COMPANY NET EARNINGS — (from which shareholders' dividends are paid) $171,707,000 or $5.69 a share. This compares with $155,923,000 or $5.31 a share in 1948.

DIVIDENDS — $4.00 a share plus one share for each 50 shares held.

EMPLOYEE RELATIONS — Again no work interruption due to labor difficulties.

• • •

Copies of the full report will be gladly sent to anyone wishing full details. Write Room 1626, 30 Rockefeller Plaza, New York 20, New York.

International news and notes

Keith Lewis

Lewis to Manage Winnipeg Refinery

Keith Lewis, who since 1948 has been superintendent of the Montreal East refinery of Imperial Oil Limited, has been appointed superintendent of its new Winnipeg refinery. Mr. Lewis joined Imperial in 1933 at the Halifax refinery. During the war he served St. Clair Processing Corp. as one of the specialists needed for Canadian production of synthetic rubber. Shortly after the St. Clair company was merged with Polymer Corp., he returned to Imperial. He held various appointments in the manufacturing department before his appointment in 1948 as superintendent of Montreal East refinery.

Construction Starts on Antwerp Refinery

Construction is now under way on a complete 30,000-barrel refinery for the Société Industrielle Belge des Pétroles at Antwerp, Belgium, according to an announcement of The M. W. Kellogg Co. Contract for the work is held jointly by The M. W. Kellogg Co. and its European subsidiary, Kellogg International Corp. Purchase of a major portion of all materials and equipment for this multimillion-dollar project will be from Belgian and other non-dollar manufacturing areas.

As part of the overall industrial expansion in Europe, the new plant, being financed by Belgian interests, will have facilities for operation as a completely integrated refinery. It is located on a site adjacent to the Scheldt River, and extensive development work is being undertaken by the Port of Antwerp Authority to improve facilities for the ships that will bring the crude to this refinery. Sufficient space has been provided for the future addition of process units to produce additional products, such as lubricating oils and high octane gasoline. Completion is scheduled for mid-1951.

Sanders Heads Sales for Reads Ltd.

W. J. Sanders has been appointed general sales manager of Reads Limited of Liverpool and its associated companies. Mr. Sanders was sales manager of the Metal Box Co., South London branch, where he spent 21 years. During the war he served in the RASC and was commissioned in 1943. He rejoined Metal Box Co. in 1945. Mr. Sanders succeeds Leonard Dodd, who is remaining with Reads Limited as general sales adviser.

Dr. Hans E. Thalmann

DR. HANS E. THALMANN has joined International Petroleum Consultants Inc., Pasadena, as consulting paleontologist, stratigrapher and geologist. Dr. Thalmann has devoted 25 years to petroleum exploration work in foreign countries; for the Shell Group (1925-34) in eastern Mexico and Indonesia; for the Standard-Vacuum Oil Co. (1935-41) in Indonesia; for the Standard Oil Co. (N. J.) and the International Petroleum Co., Toronto, in Ecuador (1942-45); and for the Venezuelan Atlantic Refining Co. (1947-50) in Venezuela. From 1945 to 1947 he was research geologist for Standard-Vacuum Oil Co. in New York.

Weir to Manufacture De-Oiler

An exclusive license has been granted to G. & J. Weir, Ltd., Cathcart, Glasgow, for the manufacture and sale of the Lawson de-oiler in Great Britain and most European countries, under the name Weir-Lawson De-oiler. The de-oiler has no moving parts. It consists of a circular tank containing the de-oiling elements, installed in the line between the condensate pump and the boiler feed tank.

Engine Exhibit

Associated British Oil Engines Ltd., London, will exhibit a considerable number of diesel and gasoline engines at the Mechanical Handling Exhibition which opens at Olympia, London, on June 6. Diesel engines of 1, 2, 3, and 4 cylinders are to be exhibited. These units will have power ratings as low as 3 to 4.5 bhp at 1,000 to 1,500 rpm and as high as 20-40 bhp at 800-1,500 rpm. Extension shafts on some models provide rated power output at half engine speed.

In addition to diesels, ABOE will display a line of gasoline engines of various ratings. Small single and two-cylinder models of low horsepower ratings will be exhibited along with four-cylinder engines for either automotive or industrial purposes.

Showing Reported In Assam

The Burmah Oil Co. (India Concessions) Ltd. announced from Digboi headquarters that traces of oil have been reported in the Barsilla (Assam) test well where the company is exploring the possibilities of new sources of petroleum in India. Showings were found in sandstone samples encountered at about 4,000 feet. Barsilla, which is located in the Assam jungle about 14 miles south of Sibsagar, has hitherto yielded no sign of being oil-bearing.

ISAP Council Meets At Montevideo

Standard nomenclature terms for the oil industry in Latin America were adopted at a meeting of the International Permanent Council of the South American Petroleum Institute held at Montevideo April 10 to 12. It was agreed to publish the proposed dictionary of oil terms later this year. The dictionary has been prepared by the Argentine section of the Institute and will contain Spanish-English and English-Spanish sections.

It was decided to hold the South American Petroleum Congress during the first half of 1951. Place and dates will be decided later. The council discussed also the possibility of conflict with the World Petroleum Congress to be held in Holland next year. Reports were presented by committees on finance and foreign affairs, technical matters and domestic affairs.

Delegates at the International Permanent Council of the South American Petroleum Institute, seated: Ing. Oscar Serrat (Argentina), Ing. Emilio Montané (Argentina), Coronel Tydeo Larre Borges (Uruguay), Doctor Carlos E. Velarde (Peru), and Ing. Emilio Vaiña (Bolivia). Standing: Ing. Francisco Papa Blanco, Ing. José Rodolfo Fosalba, Clinton B. Poore, Ing. Ezequiel Pérez Prins, all from Uruguay; Ing. Bernardo Rikles, Manuel N. Costa, Adrían Bolland, all of Argentina; Dr. Reynaldo Deambrosis and Ing. Ernesto Pelufo of Uruguay; and Ing. Germán E. Villar, Secretary General of ISAP.

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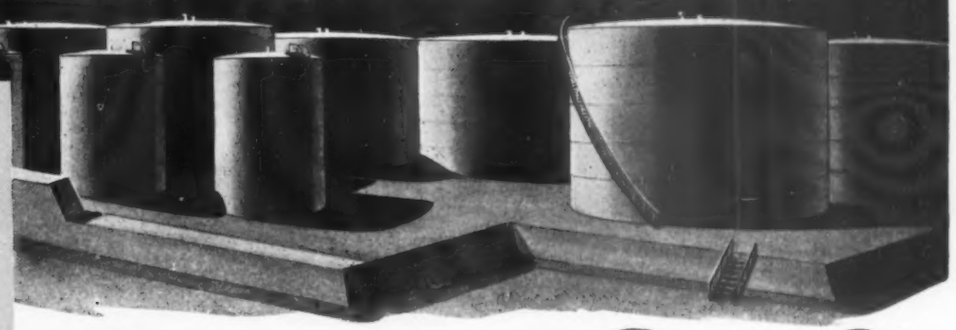

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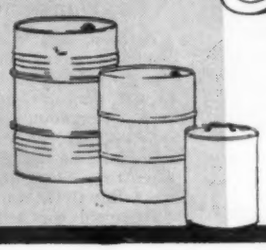

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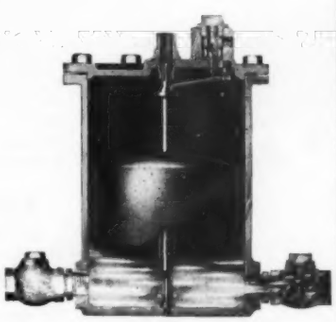

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combines the good qualities of a pressure pump and a vacuum trap. Pumps condensate from low-pressure or vacuum vessels and lifts up to fifty feet; pumps boiling, cold or gaseous fluids (including oils); pumps petrol, benzine, dye liquors and alkaline liquors such as caustic, ammonia, etc.; drains sump holes, pits, excavations (where it may be fully submerged). ENTIRELY AUTOMATIC. *Details of "Ogden's Patent Pump" (in five sizes) from:* OGDEN & CUNLIFFE, (Petroleum Dept.) Charlton House, Cheltenham, Glos., Eng.

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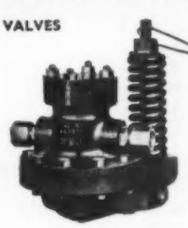

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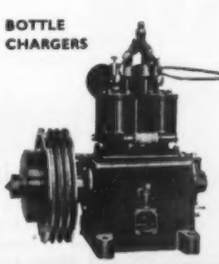
Air Starting Motors for Compression Ignition Engines and Gas Turbines. Robust, reliable, easy to install and economical in operation. For use with engines from 20-BHP to 750-BHP. Fire risk eliminated. Leaflet No. 32 gives full details.

BOTTLE CHARGERS



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SPECIALISTS IN COMPRESSED AIR EQUIPMENT & HIGH PRESSURE RAM PUMPS

Frederick A. Sutton

Death of Fred Sutton

Frederick A. Sutton, Creole Petroleum Corp. geologist known throughout the oilfields of Venezuela as Fred, died in a Salt Lake City hospital on April 25 of a kidney ailment, at the age of 55. Fred was to have been retired on August 1 of this year. He had done no active work since last June, when he went to the hospital in Salt Lake after some months of rest in Barbados.

He had been employed by Standard Oil Co. (N. J.) affiliates for 28 years, coming to Creole in 1938 as a geologist in Eastern Venezuela. He was chief surface-exploration geologist in the Caracas office from 1944 until death. After his military service in World War I, he went to South America in 1921 for Tropical Oil Co. in Colombia. Subsequently, he spent 11 years in Bolivia and a year and a half in China and Tibet on loan to Standard Vacuum. He was the author of a comprehensive article on the geology of the Maracaibo basin, which has been required reading in many universities since its 1946 publication in the AAPG Bulletin.

His widow, Mrs. Anne Sutton, was formerly Venezuela correspondent for WORLD PETROLEUM.

First Quarter Production

World production of crude petroleum averaged 9,505,300 barrels daily in the first quarter of 1950, an increase of 169,900 barrels per day or 1.8 percent over the average for the entire year 1949.

The increased rate of output was centered in the eastern hemisphere and specifically in Persian Gulf fields where the Anglo-Iranian Oil Co. has increased its production to supply areas in which dollar oil is being partially or wholly excluded in order to assist the British government in its monetary program.

Persian production averaged 645,400 barrels daily in the first quarter, an increase of 89,400 barrels daily over 1949. Qatar became a producer for the first time with an average output of about 22,000 barrels daily. Output of Kuwait with its 50-percent British interest was 32,400 barrels daily above the 1949 average. Iraq production was up 30,000 barrels daily over 1949 because of the enlarged pipeline outlet completed several months ago. In the Far East British Borneo and Indonesia continued to produce more oil.

United States production averaged about 4,913,000 barrels in the first quarter compared with an average of 5,042,000 barrels in 1949, a drop of 129,000 barrels daily or 2.6 percent. Moderate increases continued in Canada and in Mexico. The big increase in Canadian output still is delayed for want of low-cost transportation facilities.

Latin American production was up 65,900 barrels daily average in the first quarter. This was due entirely to Venezuela, where output rose to 1,465,000 barrels daily in January to take care of fuel oil demand but has since dropped to about the 1949 average.

Kuwait production for 1949 was erroneously reported in the April issue of WORLD PETROLEUM when, through mischance, 1948 instead of 1949 figures were given. Kuwait production in 1949 was 89,910,000 barrels compared with 46,500,000 barrels in 1948. In the first quarter of 1950 production totaled 25,695,000 barrels or at the annual rate of about 103 million barrels, an increase of about 15 percent over last year.

WORLD CRUDE OIL PRODUCTION

Thousands of Barrels Daily

	1949	1st Quarter 1950
North America		
United States	5,042.0	4,913.0
Canada	59.0	63.0
Mexico	164.0	177.0
Total No. America	5,265.0	5,153.0
South America & Caribbean		
Venezuela	1,321.4	1,390.0
Colombia	81.4	81.5
Argentina	63.5	61.0
Trinidad	56.0	56.0
Peru	40.0	41.0
Ecuador	7.2	7.2
Bolivia	1.9	0.7
Cuba	0.3	0.3
Brazil	0.3	0.4
Total So. America	1,572.0	1,638.1
Total Western Hemisphere	6,837.0	6,791.1
Europe		
Romania	85.0	82.0
Austria	18.0	22.0
Germany	16.0	21.0
Netherlands	11.6	14.0
Hungary	10.3	10.2
Yugoslavia	6.5	6.5
Poland	2.7	2.7
Albania	2.5	2.5
France	1.0	1.3
United Kingdom	0.9	0.9
Czechoslovakia	0.8	0.8
Franch Morocco	0.4	0.8
Italy	0.2	0.2
Europe Ex USSR	155.9	164.9
USSR	690.0	720.0
Total Europe	845.9	884.9
Near and Middle East		
Iran	556.0	645.4
Saudi Arabia	477.0	451.0
Kuwait	242.0	274.4
Iraq	85.0	115.0
Egypt	45.0	44.0
Bahrein	30.0	30.0
Turkey	0.3	0.7
Qatar	—	22.0
Total Near & Middle East	1,435.3	1,582.5
Far East & Oceania		
Indonesia	131.5	151.0
British Borneo	68.0	75.0
New Guinea	4.7	4.8
India	4.6	5.5
Japan	3.7	5.0
China	2.0	2.0
Pakistan	1.7	2.5
Burma	1.0	1.0
Total Far East	217.2	246.8
Total Eastern Hemisphere	2,498.4	2,714.2
WORLD TOTAL	9,335.4	9,505.3

Drilling in Venezuela

There has been no significant change in the number of rigs drilling new holes since April 1. Shell continues to operate the largest number of rigs, 23, and Mene Grande was second with 19. Other company rigs brought the total up to 74, or one more than in April.

Shell's seven rigs on exploratory drilling included one deeper-pool test, LB-273 in Pueblo Viejo, and six new-field wildcats. Of these latter, DMC-1, nine kms from production in the District of Mara, was testing at the middle of May, as was VL-2, 21.5 kms offshore in Lake Maracaibo.

Mechanical difficulties made it impossible to test the lower hole at Creole's Alturitas-1, near Motilone Indian country, which at 17,039 feet is the deepest hole ever drilled outside the United States. Testing continues up the hole.

Mene Grande's SG-3, in the new Mapiri field halfway between the Anaco and Oficina areas, was completed as a dual-zone producer for 1,135 barrels on 5/16-inch choke, gravities 22.5-25.5° API. Their new-pool wildcat in East Leona, LXG-101, 3.8 kms from production, was completed for 250 barrels of 22.8° gravity on ¼-inch choke.

Tubewrights Exhibit at Olympia

Tubewrights, Ltd., a subsidiary of Stewarts and Lloyds, Limited, is exhibiting a representative selection of tubular steel stillages developed for British Railways and other industries at the Mechanical Handling Exhibition. A full range of photographs is shown of tubular steel crane and dragline jobs and erection sticks, ranging from 30 to 120 feet, as well as other examples of the application of steel tubes to mechanical handling problems, including tractor hoists and car loading gear for use at docks.

Bunkering Station Map

William Cory & Son, Ltd., Fenchurch Street, London, general bunker sales agency for Anglo-Iranian Oil Co., Ltd., has published a revision of its wall map showing oil and coal bunkering stations throughout the world. As a supplement to the wall map, the company has prepared a booklet containing detail maps of 16 important areas, permitting closer inspection of these ports than is possible in the world map.

To avoid confusing detail on the wall map, load lines have been eliminated. This data is included in a chart in the supplemental booklet previously mentioned. The booklet chart shows seasonal winter and seasonal tropical zones as differentiated from year-round summer and tropical zones. This is information of special value to ship owners and operators.

Flexibox in Canada

Flexibox Ltd., manufacturers of mechanical seals, and Vokes (Canada) Ltd., a new subsidiary of Vokes Ltd., have concluded an agreement for the sales and servicing of Flexibox mechanical seals in Canada. Vokes (Canada) Ltd. is exhibiting Flexibox products at the International Trade Fair from May 29 to June 9 at Toronto.

Economy in Barge Maintenance

As an experiment in economizing on barge maintenance costs, Mene Grande Oil Co. recently capsized a 120-ton displacement barge in the water, using a barge-mounted 30-ton crane for the purpose. The bottom was more effectively exposed than in drydock—since the hot enamel was applied downward instead of overhead, less than half the usual quantity of this material was needed. Overall saving, in time, towing and drydock charges, etc., was on the order of 50 percent as compared with the conventional method.

Barge capsized for overhauling

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Left to right, Chester M. Crebbs, Hon. Jose Rafel Pocaterra.

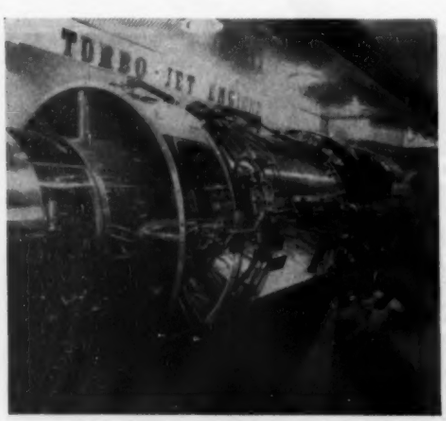
Venezuela Honors Crebbs

Chester M. Crebbs, who recently retired as president of Mene Grande Oil Co., has been awarded the second highest decoration of the Venezuelan government. Presentation was made by Hon. Jose Rafael Pocaterra, ambassador to the United States. The decoration, the Order Francisco de Miranda, second class, was presented to Mr. Crebbs as reward for his "services made to science, to progress of the country and to outstanding merit." Mr. Crebbs recently completed 31 years of service with the Gulf companies, 26 of which were spent in Venezuela.

The first World War interrupted his service with the Empire Oil and Gas Co. of Bartlesville. He was first employed by the Gulf Oil Corp. in Texas and was transferred to the Mexican Gulf Oil Co. in 1919, with offices in Tampico, Mexico. He became chief geologist for that company shortly thereafter. In 1923 Mr. Crebbs was sent by Gulf to Venezuela and appointed general agent for the Venezuela Gulf Oil Co. in Maracaibo. In 1936 he was elected president of the Mene Grande Oil Co. C. A., which succeeded Venezuela Gulf as the operating subsidiary of Gulf in Venezuela, with headquarters in Caracas, and so served up to the time of his retirement. Mr. Crebbs, along with his wife, is presently residing in Tucson, Arizona.

G. E. Exhibit Train

The General Electric Co. has built a 10-car special train which is described as the biggest electrical display kit ever built. The "More Power to America" exhibit train represents the first attempt to display, in one series of related exhibits, the complete range of products for the production, distribution and industrial utilization of electric power. Exhibits of more than 2,000 of the most modern electric products, systems and techniques have been developed. The special will visit approximately 150 key industrial centers during 1950 and 1951. At each stop the train will be inspected by invited representatives of industry. Since it is strictly a sales project directed to industry and does not show consumer goods, it will not be open to the general public.



A full-size cutaway model of the J-47 turbojet engine displayed on the General Electric special train.

Increases Capital

At an extraordinary general meeting of CONDOR S.p.A per l'Industria Petrolifera e Chimica in Rome on March 22, it was decided to increase the company's capital to 3,000 million lire. The new capital will enable the company to finance the construction which is now in progress and which comprises:

(1) A seaport installation at Genoa and a pipeline for the transport of crude oil from Genoa to Rho, near Milan, with an annual capacity of about 12 million barrels of crude oil.

(2) A refinery at Rho on the northwesterly outskirts of Milan with a capacity of more than one million tons a year.

A. E. Halverson Retires

A. E. Halverson, director of Imperial Oil Ltd., retired at the end of April after 37 years with Standard of New Jersey companies and 16 years as an Imperial director. In 1918, five years after joining the company, Mr. Halverson was appointed assistant manager of the Alberta marketing division, and in 1921 was transferred to Winnipeg as acting manager. In 1922 he became assistant general sales manager for western Canada and in 1926 was appointed general sales manager for the territory west of Port William. In 1934 he became general manager of marketing operations throughout Canada and was elected a director. In 1945 Mr. Halverson relinquished his marketing duties and became contact director for a number of corporate departments at the company's executive offices.

Winnipeg Plant Construction Begun

Premier D. L. Campbell of Manitoba officially began construction of Imperial Oil Limited's new 10,000-barrel refinery when he turned the first sod on the 400-acre site near Winnipeg. Completion of the plant, estimated to cost $10 million, is scheduled for May 1951. The refinery has been made possible by the new Edmonton-Lake Superior pipeline which will provide low-cost transportation for Alberta crude oil. Winnipeg will be supplied from a take-off point at Gretna. The new plant will have western Canada's first fluid catalytic cracking plant.

Canadian Contract Awarded

Foster Wheeler Ltd., St. Catharines, Ontario, has been awarded a contract for the design, procurement of materials and field erection of all process units for the new McColl-Frontenac refinery at Edmonton, Alberta, including crude processing and catalytic cracking. The cost of the entire project will run close to $10 million. Work has already commenced, and the Foster Wheeler construction schedule calls for completion of this new Canadian refinery in 1951.

Drum Compound Applying Equipment

A new development in the manufacture of drums is Dewey & Almy's compound lining equipment made by Moon Brothers, Ltd., Beaufort Road, Birkenhead, England. This equipment comprises an air-operated flow gun, special camming arrangements for automatically applying solution by pressure to the end seam at the first cycle of the seaming operation, therefore ensuring that the rubber lining is inserted directly into the folded seam.

With automatic application, exactly the right amount of compound can be applied, thus eliminating any squeeze of the compound into or outside the container and reducing compound costs. Labor costs also are lower as a result of the automatic features.

When incorporated into a double seam, Darex drum compounds are resistant to alcohol, oil, gasoline, naphtha, syrups, foodstuffs, etc. They are heat-resistant and will not boil out of a chime under normal conditions when the drums go through a paint or lacquer oven. This equipment can be fitted to any known make of seamer. Dewey & Almy Ltd. have been licensed by Moon Brothers as world-selling agents.

W. G. Copeland

W. C. COPELAND has been appointed superintendent of the Eagle Point works of The Texas Co., effective immediately, it was announced by M. Halpern, vice president in charge of refining. Mr. Copeland replaces A. M. Martin, who is retiring from active company service.

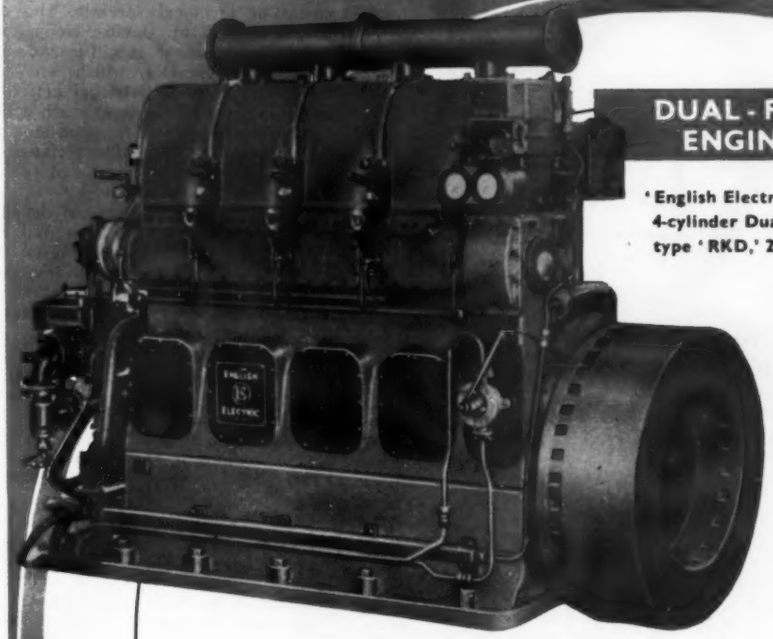
Mr. Copeland, a native of Oklahoma, was first employed by The Texas Co. in 1926 as a helper in the laboratory at the company's Port Arthur, Texas, refinery, after his graduation from Rice Institute as a chemist there. He advanced through various posts in the refining department and was transferred to New York in 1934. In 1939 he was assigned to the refinery of an affiliated company in France, and later became assistant superintendent of the company's refinery at Sunburst, Montana, in 1943. During the construction of Eagle Point refinery, Mr. Copeland was transferred to South Jersey and was appointed assistant superintendent of the refinery on June 1, 1948.

Ripley Heads Nomads Regents

Regents of the five chapters of Nomads have by mail vote chosen Fred C. Ripley Jr., International Derrick and Equipment Co., Torrance, Calif., and Lee J. Laird, Gil-Lair Products Inc., Pasadena, Calif., as chairman and secretary-treasurer respectively of the National Board of Regents for the year beginning April 1. Mr. Ripley is one of the founders of the society, being a charter member of the Los Angeles body, which started as a purely local organization in 1938. He has been continuously active since then in Nomad affairs. He was national secretary-treasurer last year. Mr. Laird has been a member since 1944 and last year served as president of Los Angeles chapter, and this year, with Mr. Ripley, was elected a regent.

Left to right: Lee J. Laird, Fred C. Ripley

'ENGLISH ELECTRIC' DIESEL ENGINES



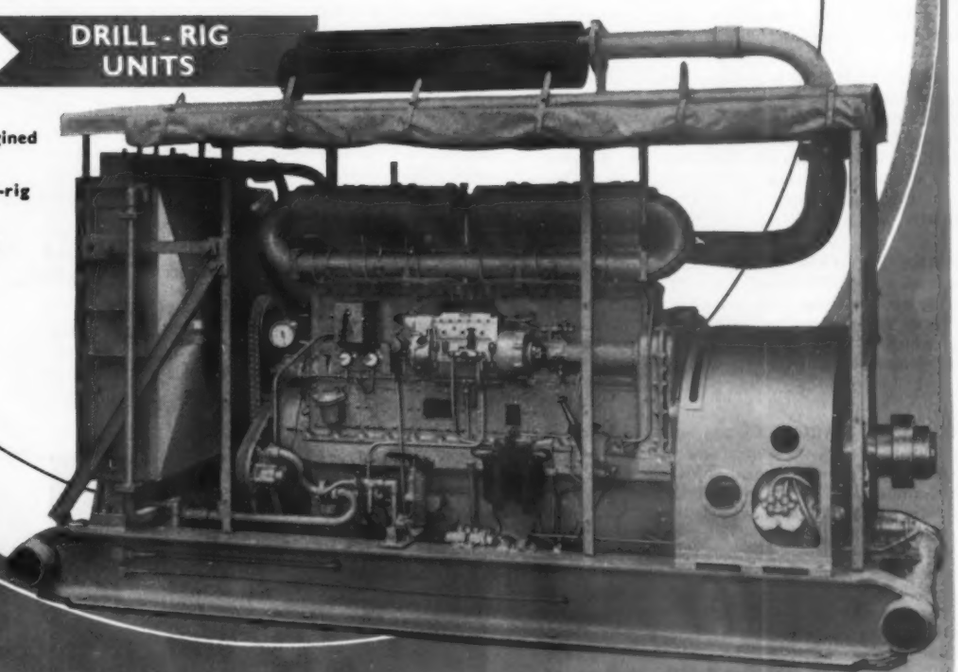
DUAL-FUEL ENGINES

'English Electric' 4-cylinder Dual-Fuel Engine type 'RKD,' 267 b.h.p. at 750 r.p.m.

Full details of the complete range of 'ENGLISH ELECTRIC' Diesel and Dual-Fuel Engines can be obtained on application to the Company's Diesel Engine Division at Rugby, England.

DRILL-RIG UNITS

'English Electric' 'H'-type Diesel-engined self-contained transportable drill-rig power unit with hydraulic coupling



THE **ENGLISH ELECTRIC** COMPANY LIMITED

DIESEL ENGINE DIVISION - RUGBY - ENGLAND

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

Oil company staff changes

John E. Allen

JOHN E. ALLEN, formerly assistant treasurer of the Gulf Oil Corp., has been appointed to the newly created position of coordinator of foreign exchange. He will coordinate and correlate all matters relating to foreign exchange for the company and its foreign subsidiaries. Gulf has subsidiaries marketing in nine countries in Europe and in Brazil and has crude oil production in Venezuela and Kuwait.

C. O. TONGBERG has been named associate director and J. G. McNab and C. L. Fleming assistant directors of the research division of the Standard Oil Development Co. Dr. Tongberg succeeds S. C. Fulton who becomes associate director of the chemical division in a reallocation of research responsibilities within the development company.

JAMES TANHAM, vice president in charge of industrial and public relations of The Texas Co., recently received the 1950 Achievement Award of the New York Personnel Management Association, which is made annually for outstanding contributions to the field of personnel administration.

FRANK R. MARKLEY has been elected vice president in charge of marketing of Sun Oil Co. Mr. Markley, former general sales manager, succeeds Samuel B. Eckert who has been connected with Sun since 1908 and who will continue with the company as executive vice president. Mr. Eckert late last year announced that he desired to retire this spring from active management in the company. In the meantime an antitrust suit was filed against Sun. The board requested Mr. Eckert to remain in active service pending disposition of this suit. As executive vice president he will devote full attention to the defense of this antitrust action.

REGINALD N. BLAIZE has been elected executive vice president of Eastern States Petroleum Co., Inc. Mr. Blaize joined Eastern States as inspection and process engineer in March 1940. In 1943 he was made assistant plant superintendent and later chief engineer. Mr. Blaize formed his own consulting company in October 1945, but in 1948 returned to Eastern States as manager of refineries, where he has served since 1948.

Henry H. Hewetson

HENRY H. HEWETSON, chairman of Imperial Oil Ltd., has been nominated for election as a director at the annual meeting of stockholders of Standard Oil Co. (N. J.) He will succeed R. T. Haslam, a vice president and director, who plans to retire in the fall. The annual meeting is to be held June 7 at the Esso Bayway refinery at Linden, N. J. Mr. Hewetson joined the Jersey Standard organization as a student engineer at the Sarnia, Ont., refinery of Imperial following his service in World War I. His first full-time job came in stoking a coal-burning still.

After serving with research and manufacturing departments of Jersey Standard affiliates, Mr. Hewetson became vice president and general manager of the Esso refinery at Baton Rouge, La. He returned to Imperial in 1935 when he turned his attention to marketing operations. In 1938 he became head of Imperial's marketing department and two years later was elected a director and a vice president. He was elected president of Imperial in 1945 and chairman in 1949.

E. O. MATTOCKS has resigned as technical representative of Phillips Petroleum Co., Bartlesville, Okla., to join the American Petroleum Institute as staff engineer in the newly-created department of technical services. The new department is headed by David Stroop, executive assistant to the president. It will provide program and coordination services, which will correlate non-divisional and inter-divisional activities; engineering and research services, which will handle the Institute's fundamental research program and its affiliations with technical associations; accident and fire prevention services and agricultural services.

Mr. Mattocks will be in charge of the engineering and research services. Frank Wilson, who is being transferred from Washington to New York, will take care of the accident and fire prevention services. Selection of a person to head up the agriculture services will be announced later.

Reginald N. Blaize

DR. GRAYSON L. KIRK, provost of Columbia University, has been named to the board of directors of the Socony-Vacuum Oil Co. Inc. He is the first board member from outside the company in the history of Socony-Vacuum. One of the nation's leading authorities in government and international relations, Dr. Kirk has been a member of the Columbia faculty of political science since 1940 and holds the rank of professor of international relations.

C. H. DODSON has been appointed manager of the Chicago sales division of The Texas Co., and W. A. Strimple succeeds him as manager of the Denver division. Mr. Dodson replaces the late J. W. McLin.

JAMES H. CURTIS has been appointed manager of manufacturing of the General Petroleum Corp., it has been announced by Gale L. Adams, vice president and director of manufacturing. This is the second advancement in 14 months for Mr. Curtis, who has been manager of refineries for general Petroleum since February 1949. Previous to that he had been in charge of the company's huge Torrance refinery.

Mr. Curtis came to General Petroleum in December 1942 from The Lummus Company, where he had been a process engineer in charge of setting up the initial operations of newly-constructed petroleum refineries. He became assistant manager at Torrance in 1944 and manager of the 100,000-barrel plant in 1945.

James H. Curtis

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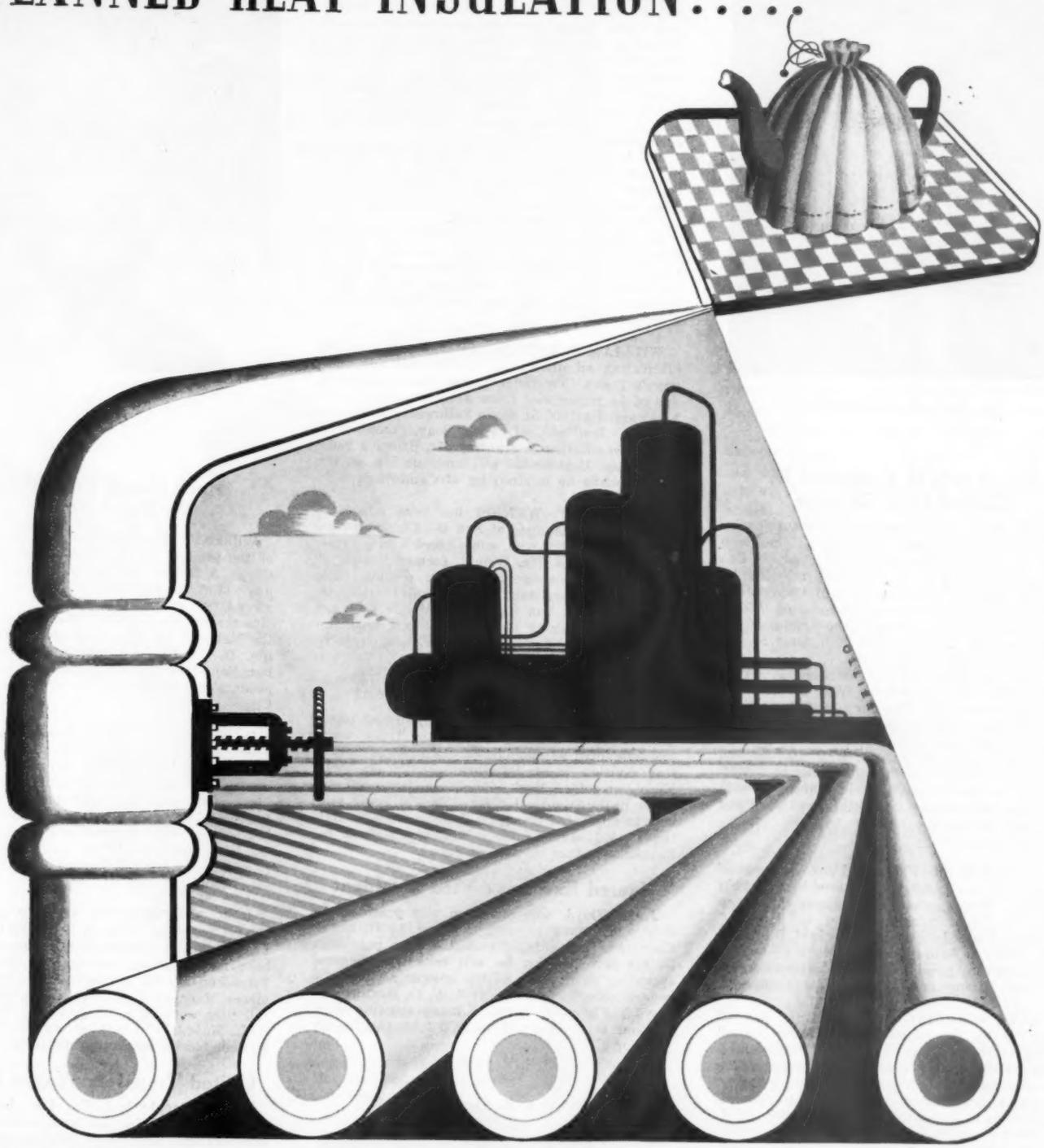

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Gen. Levin H. Campbell Jr.

Gen. Levin H. Campbell Jr. Elected UOP Director

General Levin H. Campbell Jr., executive vice president of International Harvester Co., has been elected a director of Universal Oil Products Co., Chicago, according to a statement released by David W. Harris, president of Universal. Gen. Campbell was chief of ordnance during World War II, and under his direction the Armies of the United Nations were supplied with some 50 billion dollars worth of equipment.

Immediately after the war the General served as deputy to the Director of War Mobilization and Reconversion. In February 1946 he retired from the Army with the rank of Lieutenant General and became associated with Harvester in the position of vice president. In May 1947 he was appointed executive vice president and in a staff capacity coordinates activities in connection with production, engineering, research, purchasing and traffic and inventory control as relates to manufacturing operations.

WALLACE E. PRATT, retired vice president of Standard Oil Co. (N.J.), was honored by Columbia University May 4 when he received the Kemp Medal for "distinguished service in geology." Presentation was by President Dwight D. Eisenhower. This was followed by an address by Donald H. McLaughlin, president of the American Institute of Mining and Metallurgical Engineers.

J. DAVE STERLING was elected president of Sunset Oil Co., Los Angeles, at the recent annual meeting of stockholders. As head of Eagle Oil & Refining Co. Inc., Mr. Sterling has long been an active figure in the California gasoline industry, and now, as president of two large oil companies, his activities expand over the entire Pacific coast. The two companies will be operated separately, but with advantages to both in the management and coordination in the supply of materials.

Other officers and directors of Eagle who have also been appointed to similar positions in Sunset are Morton A. Sterling, vice president and manager of production; Louis Lesser, vice president; Harvey Nelson, secretary-treasurer, and Ralph Jones and A. S. Curtis, directors. John Vizzetti, who was vice president and general manager of Sunset, continues in that capacity.

Howard Ellsworth Cole

Howard Ellsworth Cole, former vice president and a director of the Standard Oil Co. of New York, who retired in 1930, died April 27 in New York. He had been ill for the past two years. Born in Cleveland, Ohio, Feb. 13, 1873, Mr. Cole became associated with Standard Oil Co. of Cleveland as a young man. He was general manager of Standard operations in Mexico, Japan and Korea before 1914, when he returned to New York as a director of Standard Oil of New York. He became a vice president in 1924.

DR. ROY G. STORY of Swift & Co., Chicago, and Harry T. Bennett, of Mid-Continent Petroleum Corp., Tulsa, have been given the John Scott Award by the board of directors of City Trusts, Philadelphia, for their contributions to the art of stabilizing cracked gasoline. Presentation of the award was made at an oil refiners' dinner meeting at the Hotel Cleveland, Cleveland, Ohio, on May 3. The award includes copper medals and cash premiums of $1,000 for each.

Dr. Story, who is now head of the patent division of Swift & Co., was assistant chief chemist of the Mid-Continent Petroleum Corp. from 1924 to 1928, and later was patent attorney for The Texas Co. in New York.

Mr. Bennett joined Mid-Continent Petroleum Corp. in 1917. He now heads research for the company as technical director. His name is widely associated with solvent extraction of lubricants by means of Chlorex, on which work he holds basic patents.

WILLIAM F. BROWN, general foreman in the lubricating oil division of Continental Oil Company's Ponca City refinery, has been selected as one of 14 young men from American industry to be awarded a 1950-51 Sloan Fellowship at Massachusetts Institute of Technology, Cambridge, Mass. In addition to granting Mr. Brown a leave of absence, Continental will continue him on the payroll while he is studying at Cambridge.

WILLARD W. WRIGHT has been appointed general sales manager of Sun Oil Co. to succeed Frank R. Markley who was elected a vice president on April 18. Mr. Wright, former New England regional manager, has been serving since last June as assistant general sales manager. Associated with Sun since 1922, Mr. Wright has served as managing director of Sun's Canadian marketing subsidiary and as assistant western regional manager.

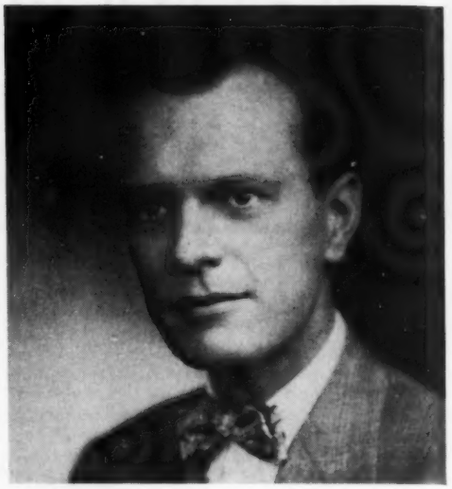
Elected Mack Vice President

F. S. NICKERSON has been elected vice president of Mack-International Motor Truck Corp. and appointed as manager of the company's central division sales territory at Chicago. Mr. Nickerson joined Mack in 1945 as sales representative in its Atlantic division. The following year he was appointed manager of the company's Baltimore, Md., direct factory branch, a post he relinquishes to take up his new duties.

Named Executive Vice President

J. M. Floyd, who has been vice president in charge of manufacturing for the A. O. Smith Corp., has been named executive vice president. In his new position he will take over general operating supervision of the company under the general direction of President W. C. Heath. Mr. Floyd has been in charge of manufacturing since he came to A. O. Smith in 1936 from the Bendix Aviation Corp.

J. M. Floyd



William T. Hack

Hack Heads Ethyl Product Development

William T. Hack has been appointed manager of the product development department of Ethyl Corp. A former member of the product development staff, he first joined Ethyl in 1946 and resigned two years later to accept appointment as director of the chemical and rubber division of the National Security Resources Board, Washington, D. C. He was production manager of the butadiene-from-alcohol section and later assistant production manager of the synthetic rubber section.

H. BLUME JOHNSON, formerly general manager of Haynesville Operators Committee, Haynesville, La., and vice president and general manager of the Butler Johnson Service Corp. at Shreveport, La., has been elected president of Butler Johnson Service Corp. This corporation has been actively engaged in oil well drilling, well servicing and workover operations in north Louisiana, south Arkansas, east Texas and Mississippi.

A. L. SPRINGFIELD, recently appointed assistant manager of Deep Rock Oil Corporation's personnel and industrial relations division, has been named acting manager of the division by President W. H. Garbade. He temporarily replaces Manager J. H. Westbrook, who will spend full time working with Marketing Vice President B. L. Majewski in making organizational studies in Deep Rock's marketing division.

United Transfers Wayne Denning

United Geophysical Co. Inc. has appointed Wayne H. Denning as area supervisor in the mid-continent area with headquarters in Tulsa, Okla. He succeeds N. J. Christie who resigned to join a new firm with headquarters in Canada. Mr. Denning has been California supervisor since a six-year term in Latin America.

James E. Pennybacker

James E. Pennybacker, chairman of the Petroleum Advisory Group at the headquarters of the Supreme Commander, Allied Powers in Tokyo, Japan, and for 25 years a Far East petroleum marketing executive for Standard-Vacuum Oil Co., died suddenly on April 21 in Tokyo at the age of 51. One of several industry experts asked by General Douglas MacArthur to advise SCAP on petroleum affairs in postwar Japan, Mr. Pennybacker had served with PAG since August 1948. During World War II he had been connected with the movement of petroleum supplies from Rangoon over the Burma Road to China. His assignments for Standard-Vacuum also had included Calcutta, Madras, Hong Kong, Nanking and Shanghai.

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There is an Axelson plunger designed to give you positive performance —regardless of your well condition— ask Axelson for Practical answers!

Oil Progress in Yugoslavia

(Continued from page 46)

Belgrad-Zagreb main railway line about 24 miles to the southeast of Zagreb). Nor is it known whether a cracking plant which the 1947-1951 five-year plan envisaged to be erected and to begin refining operations early in 1950 at the rate of 300,000 metric tons per year, has been completed. An oil refinery of an intermediate size is known to exist also at Bosanski Brod since before the war. Bosanski Brod is about 2-½ miles south of Slavonski Brod on the Belgrade-Zagreb main railway line, 137 miles west of Belgrade. Located on the southern bank of the River Sava, it enjoys the same facilities as to river transport as the Sisak refinery.

According to official Yugoslav sources three refineries were erected in Serbia during 1949 and one in Macedonia, while several refineries are said to be building in Dalmatia. Doubts have been abroad, though, as to the interpretation of the term, refinery, given in these cases and whether the proper designation of the plants concerned would not rather fit with the term, tanking plant. Some believe the plants in question to be actually refining installations for oil shale. It is known that in her present dearth for oil Yugoslavia is paying increased attention to her numerous deposits of oil shale located in various regions throughout the country. The oil content of the shale concerned averages 20 to 30 percent, it has been stated. Some of these deposits are to be found in Serbia and in Dalmatia, also in Montenegro.

So far as is known, high-grade oils, such as aviation petrol, transformer oil and other high-quality derivatives, are exclusively produced at Rijeka, Sisak and Bosanski Brod. According to the five-year plan, 1951 should see the production in Yugoslavia of 75,000 metric tons of gasoline, contrasting with only 4,000 metric tons in 1946. The 75,000 metric tons should include 20,000 metric tons of synthetic gasoline, but nothing has transpired so far as to the realization of this last-named plan.

Another noteworthy development has been the large-scale adoption of oil-burning by the Yugoslav State Railways. The gradual conversion of locomotives from coal-firing to oil-firing was begun in December 1949, with a view both to saving coal and improving the railway services. For the time being, oil-burning locomotives are in service from the locomotive depots located in Croatia and Slovenia and which, therefore, may easily obtain supplies of oil from the Lendava and Goilo fields. A saving of up to 40 percent in the consumption of coal was reported on the lines concerned soon after the first locomotives had been converted. To work a train on the Zagreb Split main line, various sections of which present the characteristics of a heavy mountain line, meant the consumption of 25 to 26 metric tons of coal for the round trip, Zagreb-Split-Zagreb, 526-3/5 miles in all. At present with oil-burning locomotives hauling the train only over certain sections, only about 14 metric tons of coal are consumed for the round trip, in addition to 3-½ to four metric tons of fuel oil.

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NATURAL GAS AND NATURAL GASOLINE

HERE is the up-to-date information you want on the production of natural gas from crude-oil, condensate, and dry-gas fields, and the manufacture of liquefied products from this raw material. The recovery of natural gasoline, as well as its transportation and storage, is discussed, and the design and operation of gas gathering and natural gas recovery systems are clearly treated.

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- *fractionation*
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This book answers specific questions on the location and design of natural gas plants, the estimation of gas and gasoline reserves, and the construction and operation of pipe lines. It takes up recent developments in fractionation, gas dehydration, oil absorption, and other operations in the industry.

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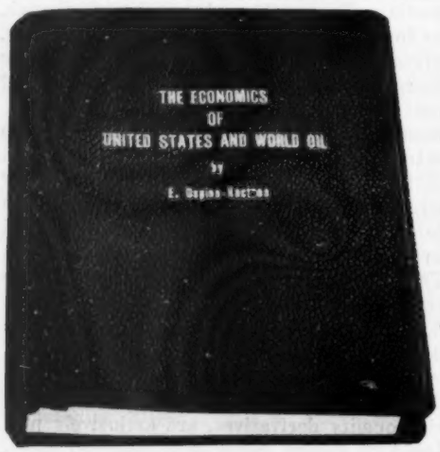

The ECONOMICS of UNITED STATES and WORLD OIL

A detailed study of the law of supply and demand in terms of U. S. and World oil

Being an outline and analysis of how the basic economic factors governing oil supply, demand, price and time lag of the United States oil industry and other factors of the countries abroad control and will govern the future development of the world oil industry.

by E. Ospina-Racines
Member of: A.I.M.E.; A.A.P.G.; A.C.S.

CONTENTS - CHAPTERS

1. Pattern of the Oil Supply-Demand-Price Cycle.
2. Operation of U. S. and World Supply-Demand.
3. World Oil Demand and Markets.
4. Pricing Crude Oil in the World Market.
5. World's Undiscovered Commercial Oil Land.
6. Appraising Prospective Oil Land.
7. Conversion of Prospective into Commercial Oil Land.
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9. Appendix.

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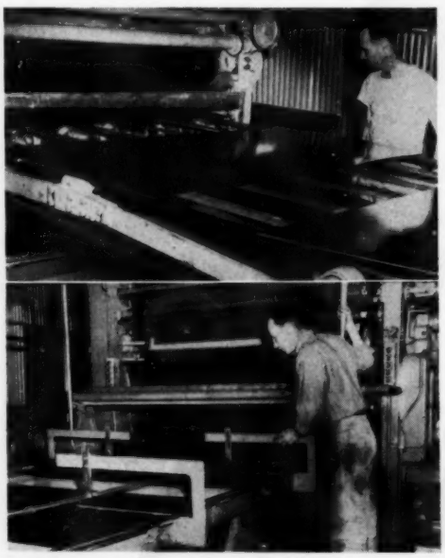
Multi-Color Lithography for Oil Drums

A new method of coating both the interior and exterior of steel drums prior to fabrication has been developed by Rheem Manufacturing Co. As a result of the new process, it is possible to lithograph the exterior of 55-gallon drums in a multiplicity of colors and in detail as fine as on paper. It is also possible to maintain uniformity of package design and labeling from a one-quart can up to a 55-gallon drum.

Presses used in the new process lithograph three by six-foot sheets of 18-gauge steel at the rate of 4,200 sheets per hour. Along with the development of the multi-color lithograph presses, Rheem has built equipment for the application of linings to containers which are controllable in thickness to a thousandth of an inch. The linings are rolled on before drums are formed in a manner similar to the lithographing of the flat sheets before fabrication.

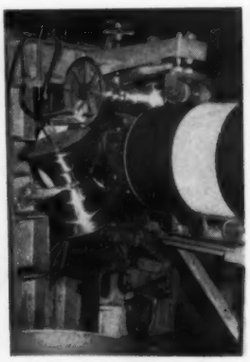
Several years of research which went into the development of the new process enabled Rheem engineers to fabricate the coated and lithographed sheets into finished drums without marring or burning the brilliantly glistening surfaces. An accompanying series of pictures illustrates various steps in the production of lithographed drums.

1. Roller-coater applies base coat to three by six-foot steel sheets and coats uniform, controlled-thickness lining on inner side. Coated sheets are picked up by oven conveyor and preheated, baked and cooled.



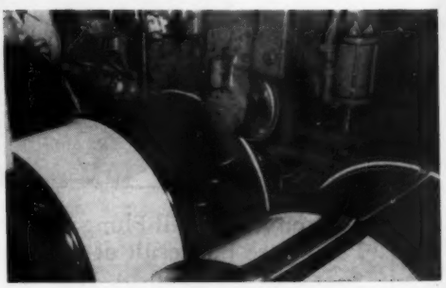
2. World's largest metal lithograph press is next step in new Rheem process. The huge press handles the 36-pound sheets of 18-gauge steel like paper, at a rate of 75 tons per hour.

3. After air-testing, drum has side seam sprayed through mask with air-dry mixture. Then chime sprayer rotates drum while spray nozzles force mixture into crevices at chime or bead of drum.

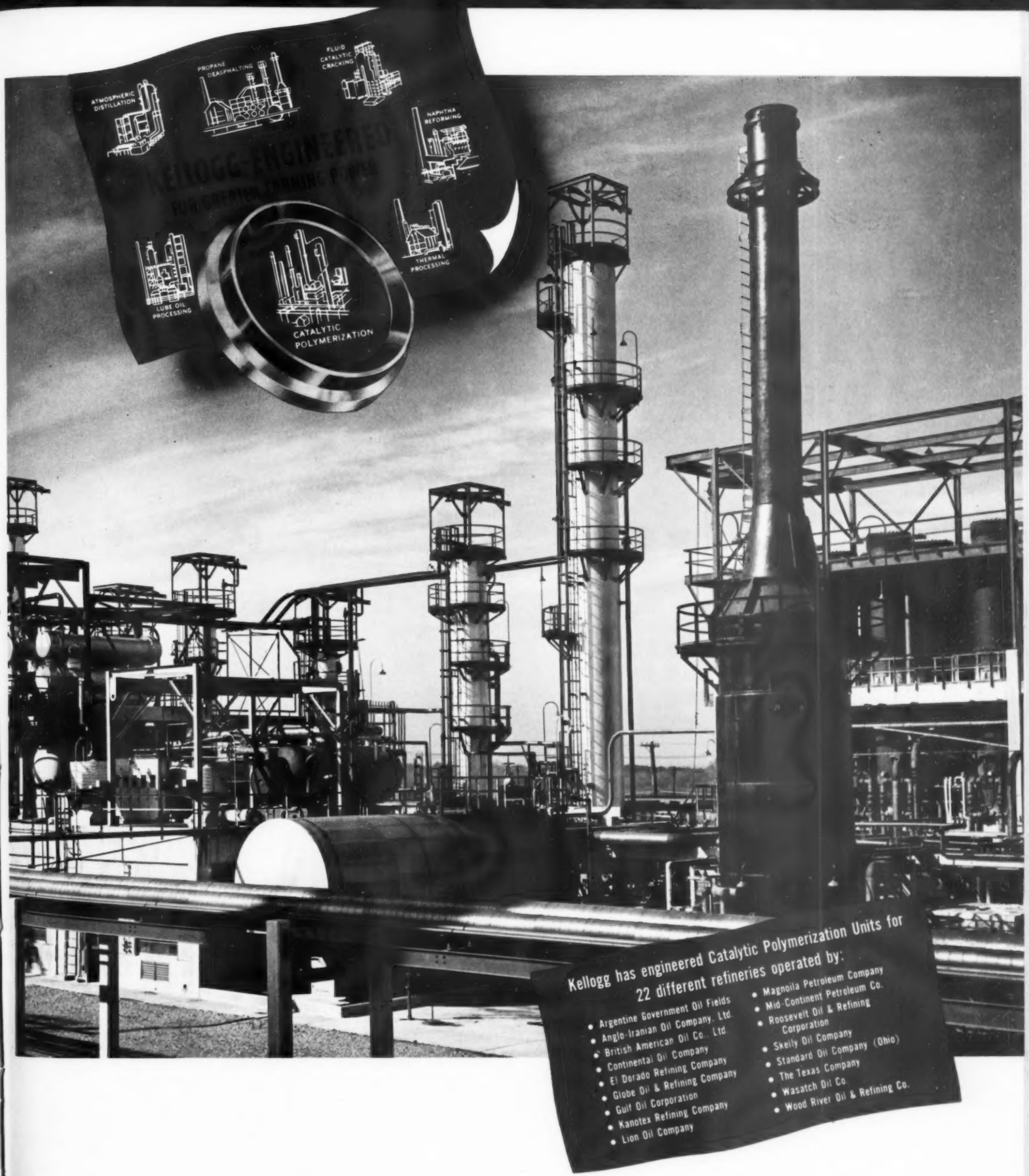


3. Electric resistance continuous seam welder forms lap weld free of scale and without burning finish or lining of lithographed drum. Polished "hour-glass" rolls hold drum to perfect circular cross-section during welding.

4. After rolling, hoops are expended into shell, drum enters specially modified double seamer. Here the rim of drum head is turned down over flange of shell, then seam is doubled back on itself.



6. Finished multi-color drums with oil company trade-marks in authentic colors and with photographic accuracy, which new Rheem process makes possible for the first time on 55-gallon steel drums.


ATMOSPHERIC DISTILLATION
PROPANE DEASPHALTING
FLUID CATALYTIC CRACKING
NAPHTHA REFORMING
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CATALYTIC POLYMERIZATION
Kellogg has engineered Catalytic Polymerization Units for 22 different refineries operated by:
• Argentine Government Oil Fields
• Anglo-Iranian Oil Company, Ltd.
• British American Oil Co., Ltd.
• Continental Oil Company
• El Dorado Refining Company
• Globe Oil & Refining Company
• Gulf Oil Corporation
• Kanotex Refining Company
• Lion Oil Company
• Magnolia Petroleum Company
• Mid-Continent Petroleum Co.
• Roosevelt Oil & Refining Corporation
• Skelly Oil Company
• Standard Oil Company (Ohio)
• The Texas Company
• Wasatch Oil Co.
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More than 240 million gallons of 80+ octane* gasoline will pour this year from Kellogg "Cat-Poly" Units!

* CFR-M

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CATALYTIC POLYMERIZATION is, naturally, an important factor in modern refinery economics. It is one of the recognized methods that refiners may utilize to control their over-all refinery vapor pressure balance. Moreover, it is an excellent source for obtaining the high octane-blending stock necessary to meet today's gasoline quality standards.

However, initial cost of facilities and daily operating costs are two major factors refiners must examine closely if they are to gain full benefit from the process.

Along these lines, Kellogg has contributed greatly toward lowering initial costs by building units that utilize soaking drums from outmoded thermal crackers. In its continuing efforts to reduce daily operating costs, Kellogg has perfected a long-life catalyst that appreciably lengthens on-stream runs.

Having started better than fifteen years ago in the field of polymerization, Kellogg became one of the original members of the POLYCO group, which licenses the basic process. This development experience in the field of catalytic polymerization, plus an outstanding position in the building of commercial plants, should merit the careful consideration of every refiner considering the addition of polymerization facilities.

CATALYST LIFE ONCE A MAJOR PROBLEM IN "CAT-POLY" ECONOMICS . . .

Major factors in the daily operating cost of a Catalytic Polymerization Unit are the cost of catalyst and the down time required to replace it. Operating at high pressure ordinary catalysts have a tendency to agglomerate quickly, producing recurrent sudden pressure drops and requiring frequent and expensive replacement.

Kellogg tackled this problem and developed a new catalyst which retains its original pelleted form and resists softening better than other types on the market. Today Kellogg manufactures this catalyst in its own plant in Jersey City.

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—laboratories, pilot plants and recognized specialists to prove and improve processing and equipment ideas.

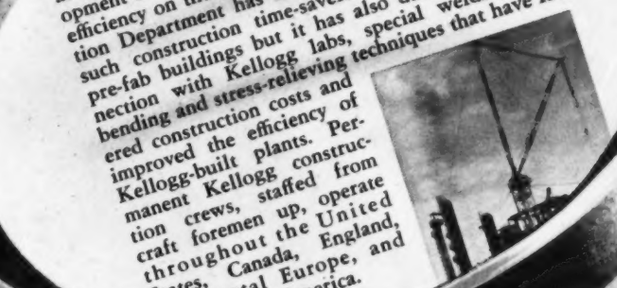
2 PROCESS ENGINEERING
by three distinct groups of specialists—*sequence* engineers, *unit* engineers and *development* engineers—supported by an extensive reservoir of exclusive data.

3 SPECIALISTS IN EVERY PHASE
of design engineering due to the completeness of Kellogg's engineering staff.

4 SPECIALIZED BUYERS
backed by the cumulative buying power of the largest company in the business.

5 COMPLETE FABRICATING FACILITIES
to make schedule deadlines and to develop workable "firsts" in refinery equipment.

6. CONSTRUCTION KNOW-HOW
acquired in completing hundreds of major jobs, plus an ample supply of the proper tools, plus the development of new time-saving methods assure maximum efficiency on the construction lot. Kellogg's Construction Department has not only pioneered the use of such construction time-savers as guy derricks and pre-fab buildings but it has also developed, in connection with Kellogg labs, special welding, pipe-bending and stress-relieving techniques that have lowered construction costs and improved the efficiency of Kellogg-built plants. Permanent Kellogg construction crews, staffed from craft foremen up, operate throughout the United States, Canada, England, continental Europe, and South America.



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But it gave people a taste of the benefits of petroleum—and a great industry was off to a flying start!

The first drilling rigs—first refining equipment—were adequate for that early demand.

But invention of the automobile, airplane, Diesel engine and other great machines in turn demanded great invention in oil—and old-fashioned equipment gave way to scientific research laboratories, modern refineries, pipelines, tankers and tank cars.

Each year demand made them bigger and better!

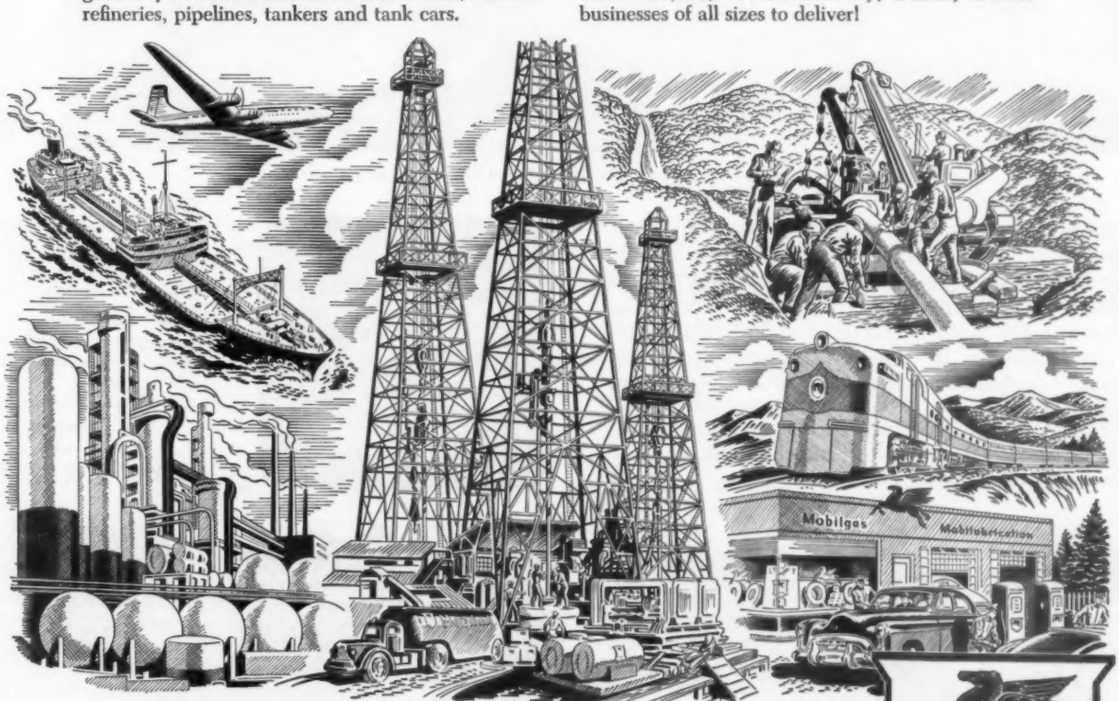
Today, thousands of oil companies with oil fields, refineries, bulk plants, service stations and cost-cutting transportation systems—deliver over 1,840,000,000 barrels of petroleum yearly—meet U.S.A.'s demands for *value in oil.*

And, today, the responsibilities of Socony-Vacuum, one of the oldest companies in the industry, are constantly mounting . . .

Unprecedented demand for petroleum products calls for expansion in every phase of our efficient, coordinated operation . . .

46,400 independent "small" businessmen must be kept *competitive*—supplied with what it takes to provide a *big money's worth* for you—a good living for themselves.

When 150,000,000 Americans say, *"I want,"* it takes businesses of all sizes to deliver!



DEMAND DETERMINES BIGNESS

The Flying Red Horse Companies

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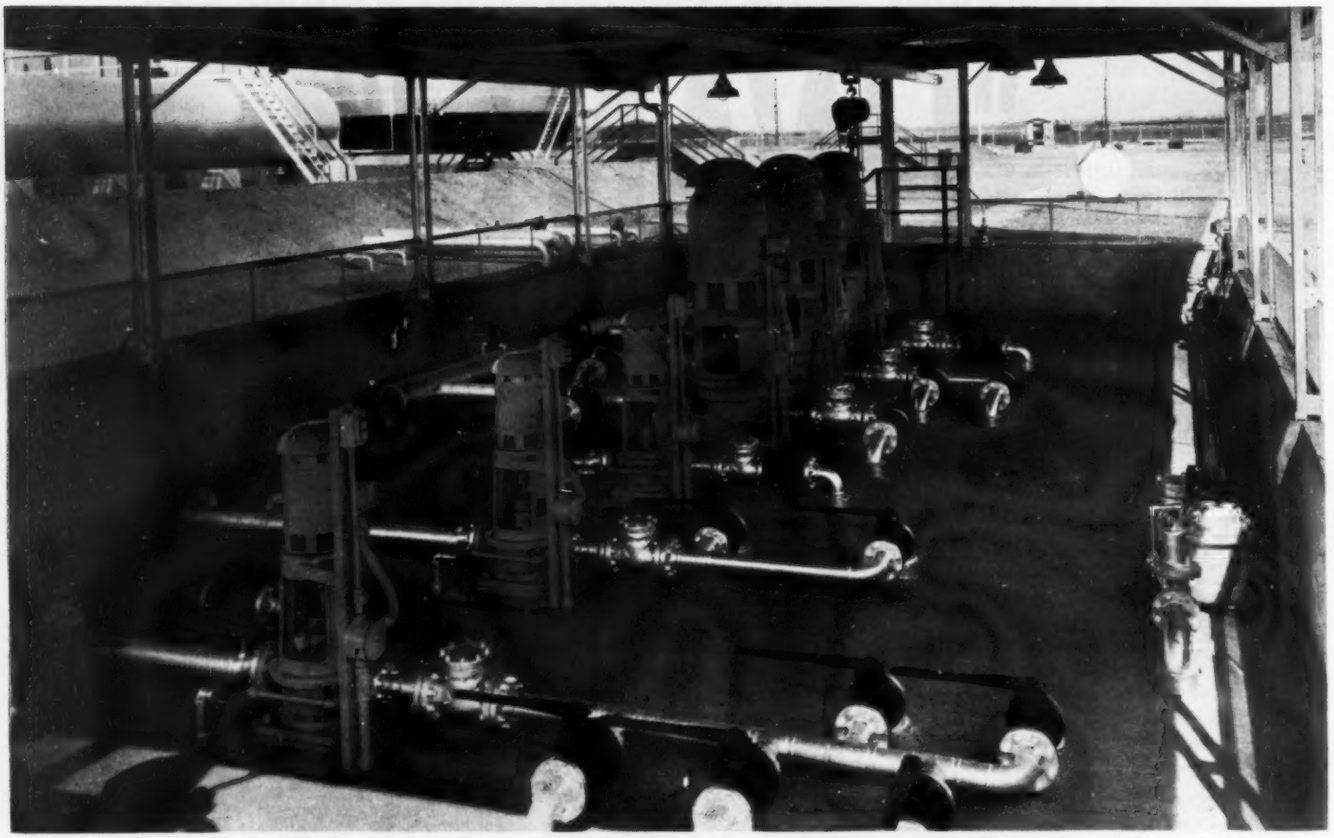
. . . infinitely safer, when lines are controlled with Audco - Nordstrom valves



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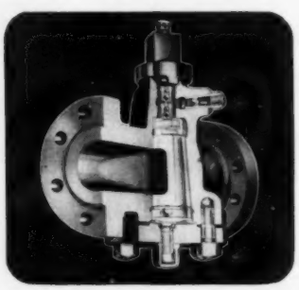
● In handling petroleum products you first consider *safety*. That calls for ever-tight valves, free from freezing, free to turn easily, positively sealed around the ports regardless of line pressure. Note how perfectly the Audco Nordstrom design fits these specifications. The tapered plug is pressure lubricated, held tight on its unexposed seat by resilient means; the lubricated seat permits easy rotary turning of the plug, as contrasted to metal-to-metal unlubricated seats in common types; pressurized lubrication surrounds each port to prevent leakage; the plug can be hydraulically jacked when required.



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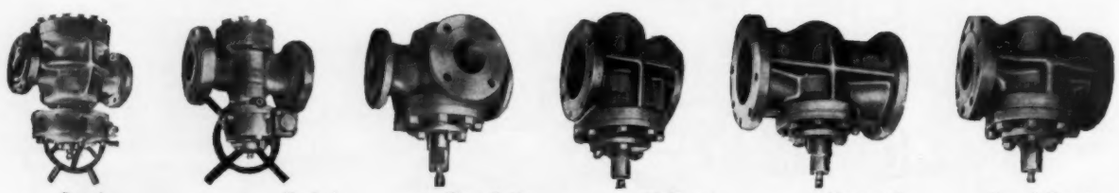

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The machine illustrated is a modification of our well known Single-ended Drum Double Seaming Machine, adapted for double seaming inverted chime stampings to drum bodies necessitating internal support. Available as Model S.D.S. in 5 and 10 gallon sizes, and as Model S.D.R.D. for sizes of 10 gallons and upwards.

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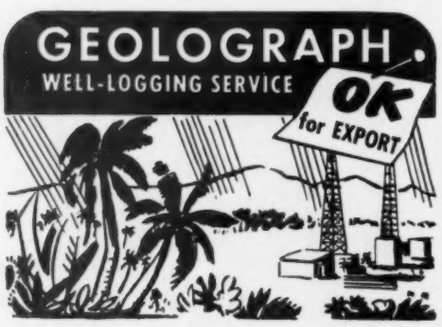
dm MB 19

New Venezuela Royalties Formula

A new agreement for the calculation of government royalties on Venezuelan crudes will be forthcoming shortly, according to an announcement of Dr. Jose Martorano Battisti, chief of the hydrocarbons section of the Ministry of Fomento. The formula in effect for some years past, based on Gulf Coast prices, was denounced by the producing companies in September last year as unfair in view of changed market conditions. The government accepted the protest, and an investigating commission of technicians headed by Dr. Gustavo Therry Fombona has been in the United States studying the problem for some months. Dr. Martorano states that the commission's work was nearly complete and that conversations toward a new agreement with the companies could be expected to start in early June.

Baker Offices Moved

New York export offices of Baker Oil Tools Inc. have been moved to Suite 307, 250 Park Ave., according to an announcement by Russ V. McIntyre, manager.



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To Enlarge Tankage

Plans for the construction of two million barrels of additional storage capacity for accumulating heating oil along the East Coast have been announced by the Esso Standard Oil Co. This is the second major step in the company's tankage building program initiated last year to reduce seasonal fluctuations in refinery production and assure ample supplies of heating oil for its customers during the winter.

Petroleum Horizons

Under this title The Lummus Company has issued a volume of 80 pages containing 31 up-to-date flow diagrams of petroleum refining and petro-chemical processes, along with typical operating data of installations built by the company for purposes that cover the gamut of petroleum refining from distillation through cracking, coking, polymerization, aviation gasoline manufacture, lube oil processing, light products and chemicals from petroleum. These flow sheets have considerable reference value. The book is distributed gratis from the company's new office at 385 Madison Ave., New York 17, N. Y.

New Treating Process

American Development Corp. has been organized to develop and license new processes and equipment for the refining industry. First offering is an electrolytic process for caustic soda regeneration developed by Peter J. Gaylor. Officers of the new company are Joseph H. Salmon, president; Dr. Charles W. Rippie, vice president; and Mr. Gaylor, secretary-treasurer, all of whom have had many years of experience in the oil industry. Mr. Salmon recently left the Shell Oil Co., and Dr. Rippie is a former Shell technologist who has been in the chemical and supply fields in recent years. Mr. Gaylor formerly was a technologist with Standard Oil Co. (N. J.) American Development offices have been opened at 201 East 57th Street, New York 22.

IHC Expands Export Organization

International Harvester Co. has appointed R. B. Bradley as director general of European operations, effective May 1. Formerly chairman of the board and managing director of International Harvester Co. of Australia, Pty. Ltd., Mr. Bradley succeeds C. D. Roice, who has been named senior vice president of International Harvester Co. of Canada Ltd., Hamilton, Ontario.

The company also announced the appointment of Joseph E. Layton as assistant director of foreign operations. He will spend much of his time visiting and supervising plants of overseas subsidiaries.

Dr. Wayne E. Kuhn

DR. WAYNE E. KUHN, manager of the technical & research division of The Texas Co., has been awarded the second Honor Scroll of the New York chapter of The American Institute of Chemists, according to Dr. Martin Meyer, chairman. The new award was made at a dinner May 24 at the Commodore Hotel. Dr. Kuhn's professional career has been largely identified with The Texas Co. He began with Texas in 1929 as a chemist. In 1938 he became manager, technical and research division, in charge of all technical and research work for the refining division of The Texas Co. In 1949 he was chairman of the petroleum division of The American Chemical Society.

New Agency Appointed

The Davison Chemical Corp., Baltimore, Md., has appointed St. Georges & Keyes, Inc., of New York, to direct its advertising, public relations and sales promotion, effective July 1, it was announced by R. L. Hockley, vice president of Davison.

Petroleum Chemicals Book

John Wiley & Sons has published an American edition of "The Petroleum Chemicals Industry," written by Richard Frank Goldstein. The author is a fellow of the Royal Institute of Chemistry and the Institute of Petroleum. Although published originally in England, the book gives an impartial and objective account of the growth of the American petroleum chemicals industry. It discusses its problems and possibilities, with special emphasis on the developments of the past ten years. The price is $8.50.

Newly elected officers and committee members of the Dallas-Fort Worth Chapter of Nomads for 1950 are left to right: Courtney Berlin, secretary; E. F. Shiels, assistant secretary; E. J. Whetzle, treasurer; J. Lewis Foster, membership Wichita Falls area; A. J. Olson, president; J. M. Bridges, deputy sergeant-at-arms; Jess Hall Jr., membership Weatherford area; Brad Mills, regent; J. E. Everroad, sergeant-at-arms; R. E. Todd, assistant treasurer. Not shown are K. W. Davis, vice president, and J. C. Baseheart, regent.

A NEW "WORK HORSE" FOR THE OIL FIELD

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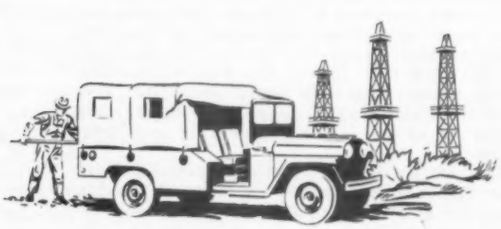
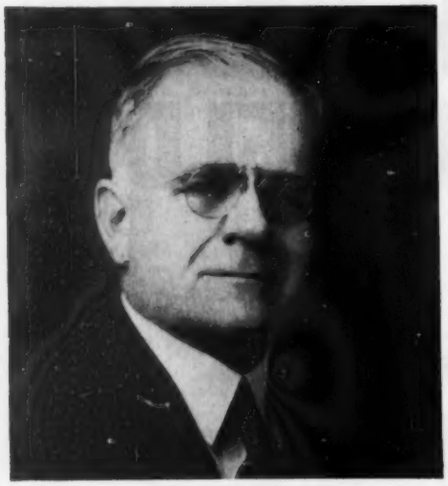
Cargo-Personnel Carrier



The Willys Cargo Personnel Carrier is unsurpassed as an emergency or general utility vehicle in or around the oil field. It takes men and materials where other vehicles cannot go—makes work easier and faster for exploration crews, facilitates laying and maintenance of pipelines, takes drillers and repair crews wherever they are needed. It has 4-wheel drive for off-the-road performance and for ground-gripping traction up steep grades and through deep mud or sand.

This vehicle has 118-inch wheelbase, carries eleven men or 2000 pounds of cargo—plus the driver. It uses the new higher-compression *"HURRICANE"* Engine for more power, more economy. Removable canvas top and folding back rests for all seats are standard equipment. Power-operated front-end winch is optional at extra cost.

WILLYS-OVERLAND EXPORT CORPORATION
Toledo 1, Ohio, U.S.A.



John G. Pew

Richard L. Burke

RICHARD L. BURKE has been elected president of Sun Shipbuilding and Dry Dock Co. to succeed John G. Pew, who resigned at 79 to take it easy after some 63 years of active work. John G. Pew Jr. was reelected vice president, and Alton A. Norton, superintendent of hull construction, was elected vice president. William Craemer was re-elected secretary and treasurer. Controller Charles H. Doyle was elected assistant treasurer and Granville D. Landing was elected assistant secretary. J. N. Pew Jr. was reelected chairman.

In 1886 at the age of 16, John G. Pew Sr. went to work for the Peoples Natural Gas Co. of Pittsburgh, founded by his uncle, Joseph Newton Pew Sr. He began as a pipefitter's helper and was steadily advanced until in 1900 he became a shop superintendent. In 1903 the Peoples Natural Gas Co. was purchased by Standard Oil Co. of New Jersey, and Mr. Pew was made general manager and vice president. In 1908 he was elected president of Peoples and of Hope Natural Gas Co., which was then the largest natural gas producing company in the world.

Mr. Pew resigned in 1918 to join the staff of the Sun Oil Co., also founded by his uncle, Joseph Newton Pew Sr., and a year later he went to Chester to become president of the Sun Shipbuilding Company, a wholly-owned subsidiary of Sun Oil Co. At that time the shipyard had five ways but shortly after John G. took charge, the ways were increased to eight, and dry dock and ship repairing facilities were added, and the company became known as the Sun Shipbuilding & Dry Dock Co. During the lean shipbuilding years between the two world wars, Mr. Pew kept the Chester yard going, while three other yards out of five in the Philadelphia area were closed.

One of Mr. Pew's greatest accomplishments was the expansion for World War II of Sun Shipyard from eight to 28 ways, with the necessary new buildings, shops and equipment. As a result of this expansion program, more than 40 percent of the tankers built in the United States during World War II were constructed at the Sun Ship yards.

Two of the important shipbuilding developments at Sun encouraged by Mr. Pew are the sub-assembly method and all-welded construction. These have greatly accelerated shipbuilding in practically all shipyards. The first all-welded tanker ever built in this country was built in the Sun yard, and today automatic and manual welding have largely replaced riveted construction there. Under Mr. Pew's administration at Sun Ship, the development and building of the Sun Doxford diesel engine has been advanced so that it now leads all other diesel engines for main ship propulsion power.

Another contribution Mr. Pew made to the country's war effort was the development and building of equipment for refining oil. The company manufactured a large volume of units for the refining of high octane gasoline by the Houdry process, and during World War II Sun Shipbuilding Co. furnished equipment to nearly every principal oil refinery in the country.

Richard L. Burke, the new president, who came with Sun Ship in 1916, has had a part in constructing all of the 525 ships launched at the plant. In 1917 he became chief draftsman in charge of structural work and was in charge of all drawings pertaining to the construction of the first drydock which was built in 1920. Upon completion of the drydock, he acted as estimator on ship repair work in conjunction with his drawing room activities. In 1927 he was elected vice president and general manager.

WM. H. MERRITT, vice president of Cities Service Oil Co. (Del.) and manager of its marketing division, has retired after 48 years with Cities Service, 14 of which were spent in developing the company's marketing and sales organization. His early experience with Cities Service was in the utility field, switching over to the refining and marketing phases of the oil industry in 1919. He will be succeeded by E. L. Stauffacher.

ROGER L. MESSMAN, assistant division geologist for Continental Oil Co., Ponca City, Okla., resigned May 1 to join William Graham, Wichita independent oil operator.

H. H. MOORE has been made sales manager of Socony-Vacuum Oil Company's White Eagle division, Kansas City, Mo., succeeding the late Charles A. Lewers. E. B. Kendrick has been made assistant sales manager.

JAMES H. PIPKIN, assistant to the chairman of The Texas Co., has been awarded a 1949 honor medal of Freedoms Foundation Inc., Valley Forge, Pa., for "outstanding achievement in bringing about a better understanding of the American way of life." The medal was presented in recognition of a speech given by Mr. Pipkin at Abilene, Texas, in March 1949, entitled "Is Our Freedom in Danger?"

DONOVAN P. DUGAN has been elected vice president of the Tuscarora Oil Co. Ltd., Harrisburg, Pa. Mr. Dugan joined Tuscarora in 1931 and was appointed assistant superintendent in 1944. Three years later he was made superintendent and a manager. In addition to his new duties as vice president, he continues in his position of superintendent.

Crude Oil Analyses

The U. S. Bureau of Mines has analyzed 35 crude oil samples of crudes produced in the Middle East, Canada and Latin America. Report of the findings is published in RI 4657 by O. C. Blade, E. L. Garton and C. M. McKinney. Free copies may be obtained from the Bureau of Mines Publication Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Gasoline Survey Enlarged

Gasoline sold in 42 cities in the United States and Canada has been analyzed by the Du Pont chemicals division for its third quarterly report. Total gasoline samples checked was 655 compared with 495 on the first survey. David H. Conklin, sales manager of the division, reports that all samples were purchased between March 30 and April 11, and all tests were completed by April 15.

Purpose is not to compete with the more extensive Bureau of Mines surveys, but to provide a rapid current check of trends for the benefit of refiners. Octane number and TEL content is given for both regular and premium grades.

Pipeline Booklet

With the assistance of scores of pipeline companies, Rockwell Manufacturing Co. has published a booklet of special interest to pipeline engineers which contains more than 200 illustrations including photographs and pipeline system maps. Data has been included on the latest arrangements of piping on main lines, in compressor and pumping plants, at tank farms, bridge crossings, town border stations, meter and regulator stations, way stations and at terminals. Details are given pertaining to valve controls on manifolds, main lines, pumps and compressors, etc. One section is devoted to the operation of automatic closing valves for emergency service.

Data is given on power-operated valves as well as tables of sizes, pressure ratings and end-to-end dimensions of all Nordstrom pipeline valves, High head extensions, locking devices and new details about lubricated valves and automatic lubrication are presented for reference. Rockwell Manufacturing Co., 400 North Lexington Ave., Pittsburgh 8, Pa., will send copies of Bulletin V-210 on request.

Ethyl Moves

General offices of Ethyl Corp. have been moved to 100 Park Ave., New York 17. In this newly-completed building Ethyl Corp. will have more adequate quarters. The telephone number is ORegon 9-2000.

Pan-Am To Build New Cracker

R. T. Colquette, general manager of the El Dorado, Ark., refinery of Pan-Am Southern Corp., has announced a contract with Foster Wheeler Corp. to construct a second fluid catalytic cracking and vapor recovery unit at the El Dorado refinery. The new unit will process 9,000 barrels a day of gas oil. Together with the coking unit now under construction, the refinery capacity will be increased 20 percent to 30,000 barrels a day and permit production of 16,500 barrels daily of motor gasoline. Foster Wheeler Corp. expects to complete the catalytic cracking and vapor recovery facilities within 12 months. The coking unit now is 35 percent complete and will be ready for operation in September.

Standing left to right: J. W. Bertetti, J. B. Hamblen, R. T. Colquette; seated: J. E. Kenney, R. J. Diwoky

Isn't this a pretty kettle of fish?

SURVEYS reveal an appalling misunderstanding among young people of the "facts of business life." For example, a poll was made among seniors in certain high schools which showed that they believe business profits are "over 50%" of the sales dollar, where actually profits average less than 8%. These students also think that stockholders receive 24% of the sales dollar, where actually it runs less than 3%.

Isn't this a pretty kettle of fish?

A greater part of the 8% of the sales dollar is reinvested in the business to expand and improve plant facilities which protects employment and creates new jobs for more workers.

Such ignorance is alarming. It is unfair to the young people themselves and dangerous to America's furture. Such misconceptions open the door to socialism, communism and all the fantasies of the handout or "something-for-nothing" state of the economic dreamers.

Our school teachers say they *want* authentic information on the business system and how it works. Only business itself can supply the facts. You as a business leader in your commuuity must share the responsibility for this misunderstanding. It is our civic duty to help overcome this misconception of everyday economics in the minds of our youth today.

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- *requires a minimum of new equipment*

More than seven years of commercial refinery operation have proved conclusively the high efficiency of the Tannin Solutizer Process* for mercaptan removal. This is the process that brings your equipment up to "new plant" standards in the economical treatment and blending of higher octane gasolines, *without* affecting the stability of the treated product.

Converting to the Tannin Solutizer Process requires a minimum investment in new equipment . . . very likely your present equipment will serve with little change.

Operating economy is an outstanding advantage of the Tannin Solutizer Process. Still another important consideration . . . *this process is not corrosive;* does *not* require equipment of special alloys.

Complete engineering service is available . . . to help plan your unit, to supervise start-up, to assist in later operation if required. We welcome the opportunity to work with you in achieving the many benefits of the Tannin Solutizer Process.

**The Tannin Solutizer Process is licensed under the patent rights of Socony-Vacuum Oil Company and Shell Development Company.*

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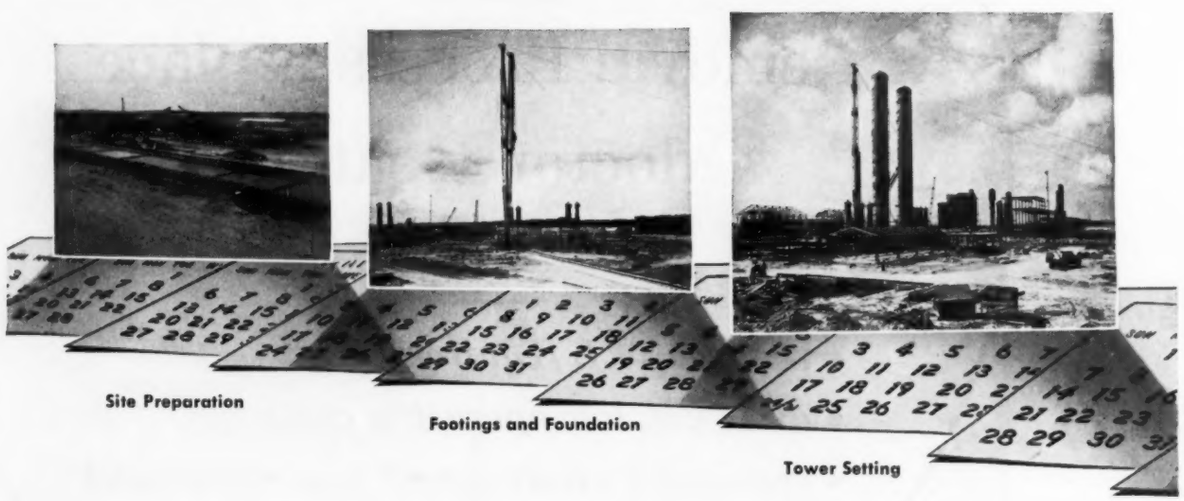

Scheduled by Lummus means engineering and construction is a complete integration of planning, forecasting and cost control, applied with individual responsibility from start to finish. Lummus' complete scheduling of your refinery project smooths the work flow. There is no wasted effort. You can count on delivery of an economical, well functioning plant on or before the required completion date.

Scheduled by Lummus means plant engineering starts earlier than conventional work planning. It begins with original process design and job engineering. Because time is money, the project is engineered from the start with emphasis on time-economies in the entire erection operation. Erection methods are analyzed in advance from the standpoint of practical application at the site.

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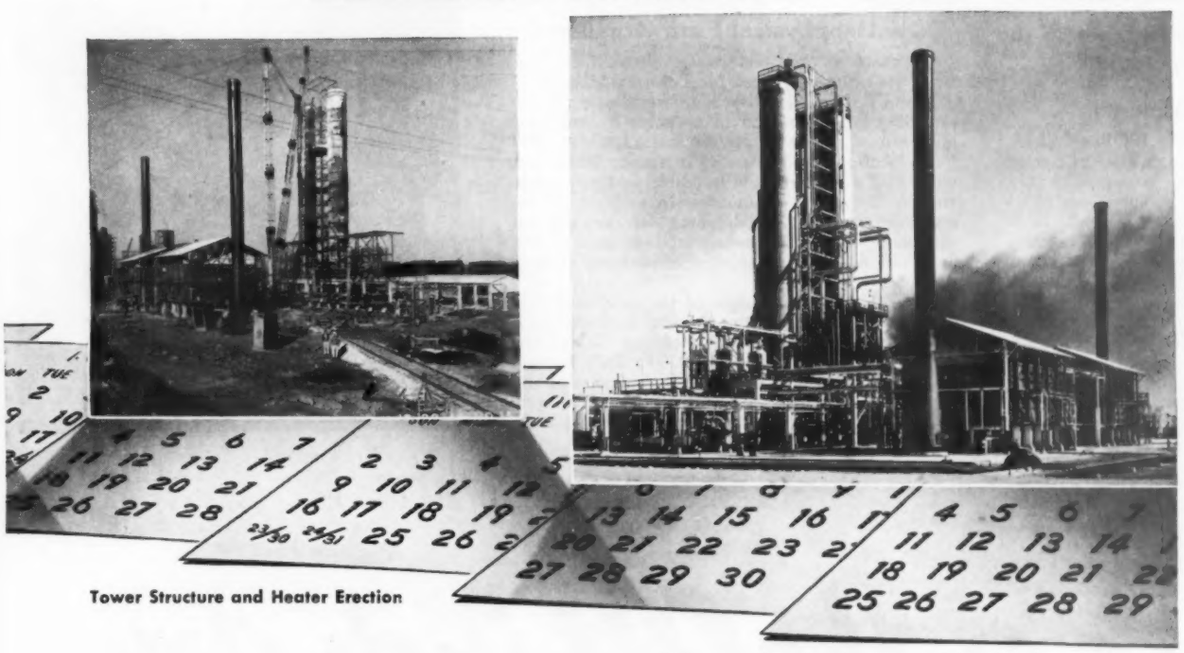
means READY ON TIME



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Scheduled by Lummus means all materials are planned to arrive as needed. Just the construction tools and skills required for the immediate use of these materials are provided at each successive stage of the job. Costs are kept under day-to-day scrutiny and control. Problems of delivering, erecting and coordinating individual units into an operating whole are anticipated, with hundreds of previous records as a guide.

Lummus' wide range of experience is the key to this thorough and advanced method of procedure. One recent job went from letting of contracts to successful operation in eight months. Another complete foreign refinery was completed in fifteen months. Your next project, "scheduled by Lummus" can be the answer to realistic cost control and the economies that come with completion on or ahead of schedule.

PETROLEUM HORIZONS, the new 80-page book on Lummus processes and plants, features a step-by-step description and flow sheets for 31 refinery processes. It brings you complete details on the background, organization and world-wide services of the Lummus Company. Your copy available on request.

Left to right: Charles Towery, Charles Wirth III

Du Pont Appointments

Ray E. Miller, director of the Du Pont petroleum chemicals division, has named Charles Wirth III as eastern district manager of the division. Mr. Wirth moves from Tulsa, where he was mid-continent district manager, to New York City. At Tulsa he organized the office and Petroleum Service Laboratories during 1947, just before Du Pont began marketing its Tetraethyl lead compounds directly to the petroleum industry. Mr. Wirth served with the Gulf Oil Corp. and Universal Oil Products Co. prior to joining Du Pont.

Charles D. Towery, service representative in the Gulf coast district, has been appointed mid-continent district manager succeeding Charles Wirth. Mr. Towery worked with the Gulf Oil Corp. and the Pure Oil Co. before his Navy service. He worked with Bethlehem Supply Co. after the war until he joined Du Pont in 1947.

Export Department Formed

American Cyanamid has formed a dyes and chemicals export department which will handle all foreign activities in connection with the products of the company's Calco chemical division (except pharmaceuticals), industrial chemicals division and plastics and resins division. The combined department will be under the direction of Fraser M. Moffat, Jr. Products handled by the new department include heavy chemicals and industrial chemicals for the petroleum and other industries.

The Lummus Co. Moves

General offices of The Lummus Co. have been moved to 385 Madison Ave., New York. The new telephone number is PLaza 9-1180.

New Geophysical Firm Organized

A new firm, Midwestern Geophysical Laboratory, has been announced for Tulsa by M. E. Morrow and E. Jack Handley, both well-known in the seismic exploration and manufacturing business. Midwestern is now doing business from its Red Fork location, 2803 West 40th Street, Tulsa, but will build a modern new building on South Harvard in the next few months. In addition to the manufacture and development of geophysical equipment and other industrial instruments, the firm will continue to engage in contract seismic surveys.

M. E. Morrow, president of the new company, has been active in the geophysical business since he joined Humble Oil and Refining Co. in the geophysical laboratory in 1930. In 1935 he was transferred to Tulsa, where he took charge of the mechanical shops of the Carter Oil Co. geophysical laboratory. In 1943 he resigned from Carter to become production manager of the electronic and geophysical section of Engineering Laboratories Inc. He has spent the last few years in development work and manufacturing of geophysical and seismic instruments, as executive vice president, treasurer, director and principal stockholder of Century Geophysical Corp.

E. Jack Handley, executive vice president of the newly-formed Midwestern Geophysical Laboratory, began his first geophysical work in 1934, and for several years was party chief with Continental Oil Co. Later he was associated with the British American and Shell Oil companies. He was one of the original incorporators of the Century Geophysical Corp. as a director and vice president in charge of all field operations, both foreign and domestic.

G. R. (Bob) Morrow, in charge of manufacturing operations for the new firm, was a director and superintendent in charge of manufacturing operations of Century Geophysical.

Left to right: E. Jack Handley, M. E. Morrow

Focus on the Oil industry

Many years of precision engineering and manufacturing experience are focussed on the production of NH Valves and Fittings which are designed to meet the detailed needs of the Petroleum Industry—Full details of Cast and Forged Steel, Cast Iron and Bronze—Gate, Stop and Check Valves, Forged Steel Fittings and NEWMAN-MILLIKEN Glandless Lubricated PLUG VALVES for Christmas Trees, Mud Lines, etc., will gladly be supplied on application

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Erecting a new portable mast

A Shell photo

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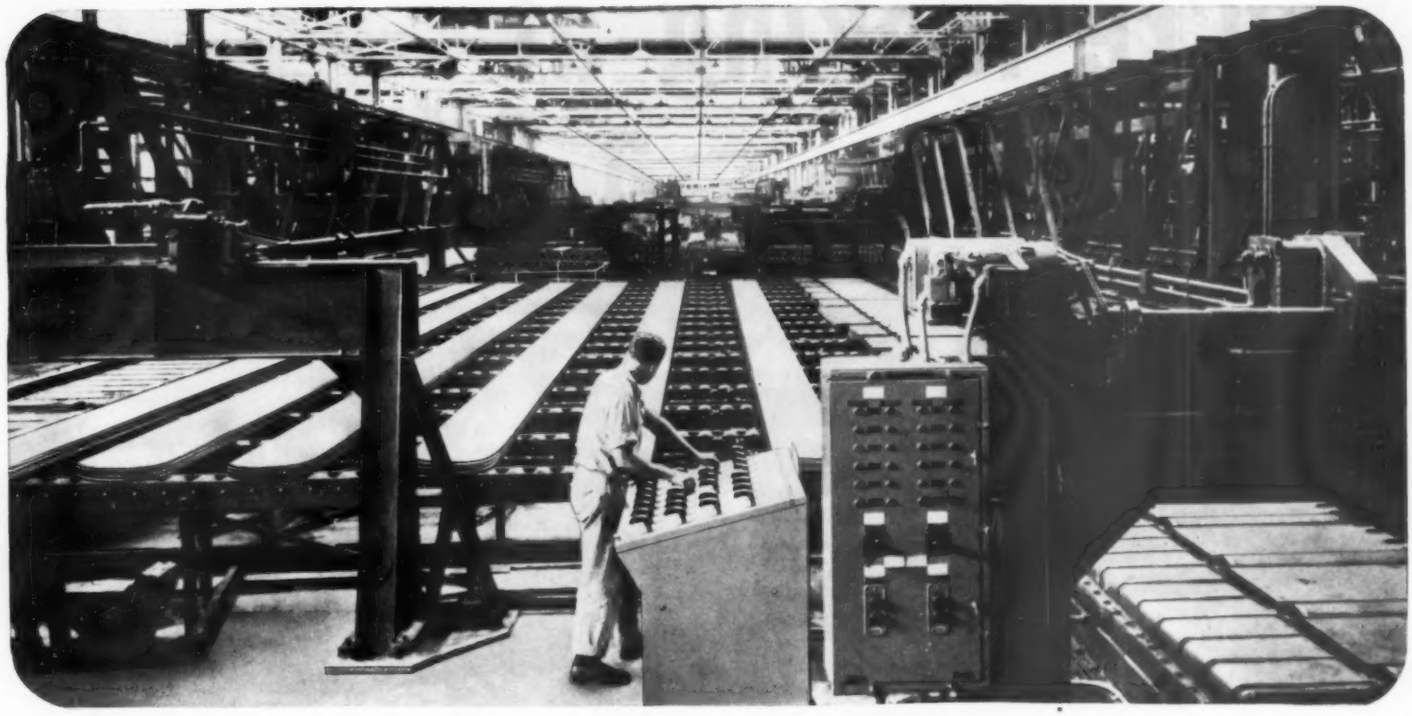
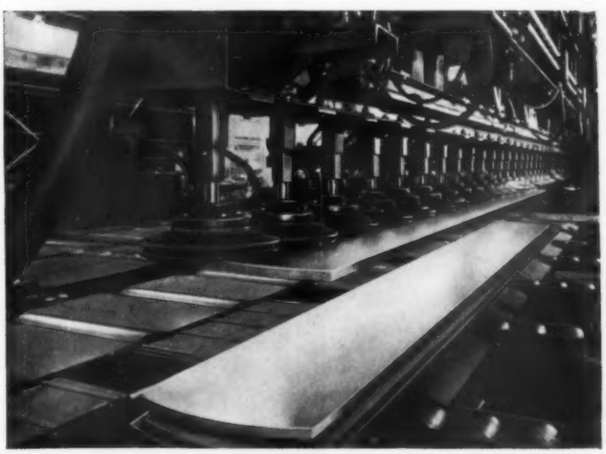


TO BUILD OR NOT TO BUILD



The smaller illustration is of the vacuum cup handling equipment operating in conjunction with the 2-Hi Cold Rolling Mill. Because of the massive size and weight of individual brass bars, all handling is mechanical.

This Mill, designed and constructed by Stone & Webster Engineering Corporation, is capable of producing the heaviest non-welded coils of strip brass, and includes the largest cold breaking-down mill in America.

For Scovill Manufacturing Company, Stone & Webster Engineering Corporation carried on continuing studies of the client's production operations over a period of four years. Analysis was made of production pattern for anticipated requirements, with costs of production in proposed mills compared with costs in the existing plant.

Companies today, faced with improving production facilities or lowering cost of plant operation, find comprehensive engineering reports by Stone & Webster Engineering Corporation valuable in developing sound, long range production plans.

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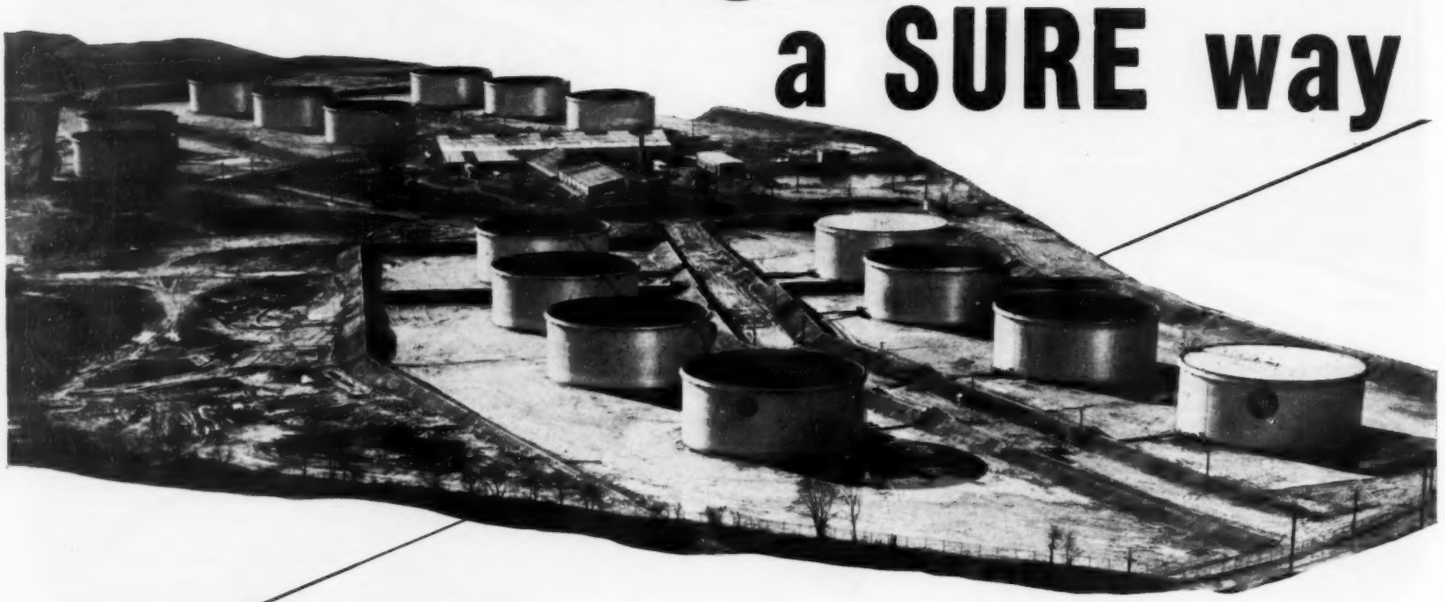
You're looking at a SURE way



This aerial view shows sixteen 96,000-bbl. oil storage tanks at the Gulf Oil Corporation's Darby Creek Tank Farm near Philadelphia, Pa. Each tank is equipped with a Horton Double-Deck Floating Roof.

...to cut storage losses and reduce the fire hazard at refineries, terminals and processing plants

The "sure way" we're talking about is the use of the Horton Double-Deck Floating Roof on each of the 16 tanks shown in the above view. Two of these roofs are clearly visible in the row of four tanks at the right.

There are two reasons why you are *sure* of getting the benefits mentioned above when you equip a flat-bottom tank storing crude oil, gasoline and other volatile hydro-carbons with this outstanding type of floating roof.

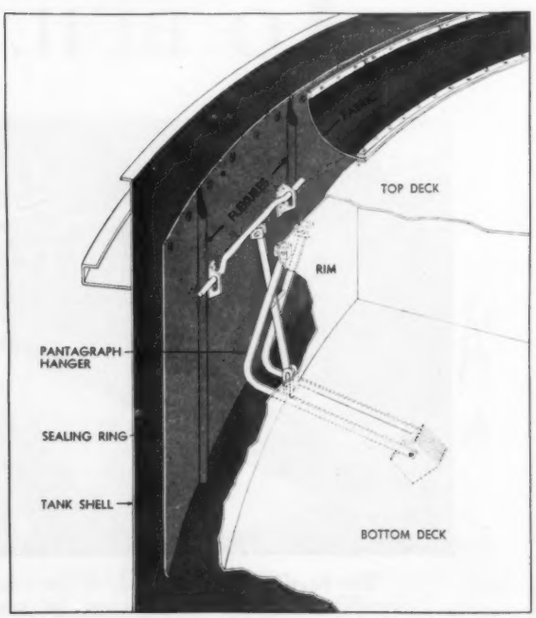
First of all, the Horton Double-Deck Floating Roof floats directly on the liquid in the tank. This cuts *evaporation losses during storage* because it eliminates the air-vapor space that exists in fixed-roof tanks. It's the expansion and displacement of this air-vapor mixture that leads to substantial breathing and filling losses through the vents of fixed-roof tanks. The *fire hazard is reduced* because, by blanketing the surface of the liquid, this roof eliminates the air necessary to support combustion.

Secondly, the Horton Double-Deck Floating Roof is equipped with the improved Horton seal shown in the diagram at the right. This effective device (1) cuts evaporation losses during storage and (2) assures that an inflammable mixture will not persist above the roof—because it prevents the escape of vapor around the edge of the deck.

The Horton Double-Deck Floating Roof is most effective on tanks filled and emptied frequently, tanks in blending service and tanks storing corrosive products. Write to our nearest office for details about this sure way to get efficient, safe storage.

• • • •

Please get in touch with us when you desire estimating figures on steel storage tanks equipped with the Horton Double-Deck Floating Roof. We also build Hortonspheres, Hortonspheroids and Hemispheroids for storing liquids under pressure, and Horton Lifter Roofs, Vaporspheres and Vapordome Roofs for vapor-saving systems serving one or more cone-roof tanks.



This diagram shows the improved Horton Seal which closes the space between the deck of a Horton Double-Deck Floating Roof and the shell of the tank on which the roof is installed. It is one of the best devices ever developed for this service because of the combined effectiveness of the sealing ring, the pantagraph hangers, and the continuous fabric. The hangers hold the ring snugly against the tank shell as the roof moves up and down. The fabric closes the space between the deck and sealing ring.

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"Hughes has the know-how"

Million-dollar rock pile to make more hole faster

The honeycombed rock pile at Hughes laboratory represents research costing more than a million dollars. For we at Hughes not only keep accurate field records of our bits in service, but, to keep on improving the performance of Hughes Rock Bits, we maintain the most extensive research department in the industry.

This unique laboratory furthers our field knowledge as to which bit designs work best in granite, chert, dolomite, limestone, sandstone and other formations found all over the world. By drilling into these test blocks, under rigidly controlled operating conditions, the action of different cones can be studied and the best type of bit for every formation definitely established.

This is just one illustration of the intensive research program—started in 1911—which Hughes Tool Company conducts in a never-ending effort to build better rock bits. Rock bits that will enable the petroleum industry to "make more hole faster." This combined experience gained in laboratory *and* field over the years has given Hughes the greatest backlog of know-how in the business!

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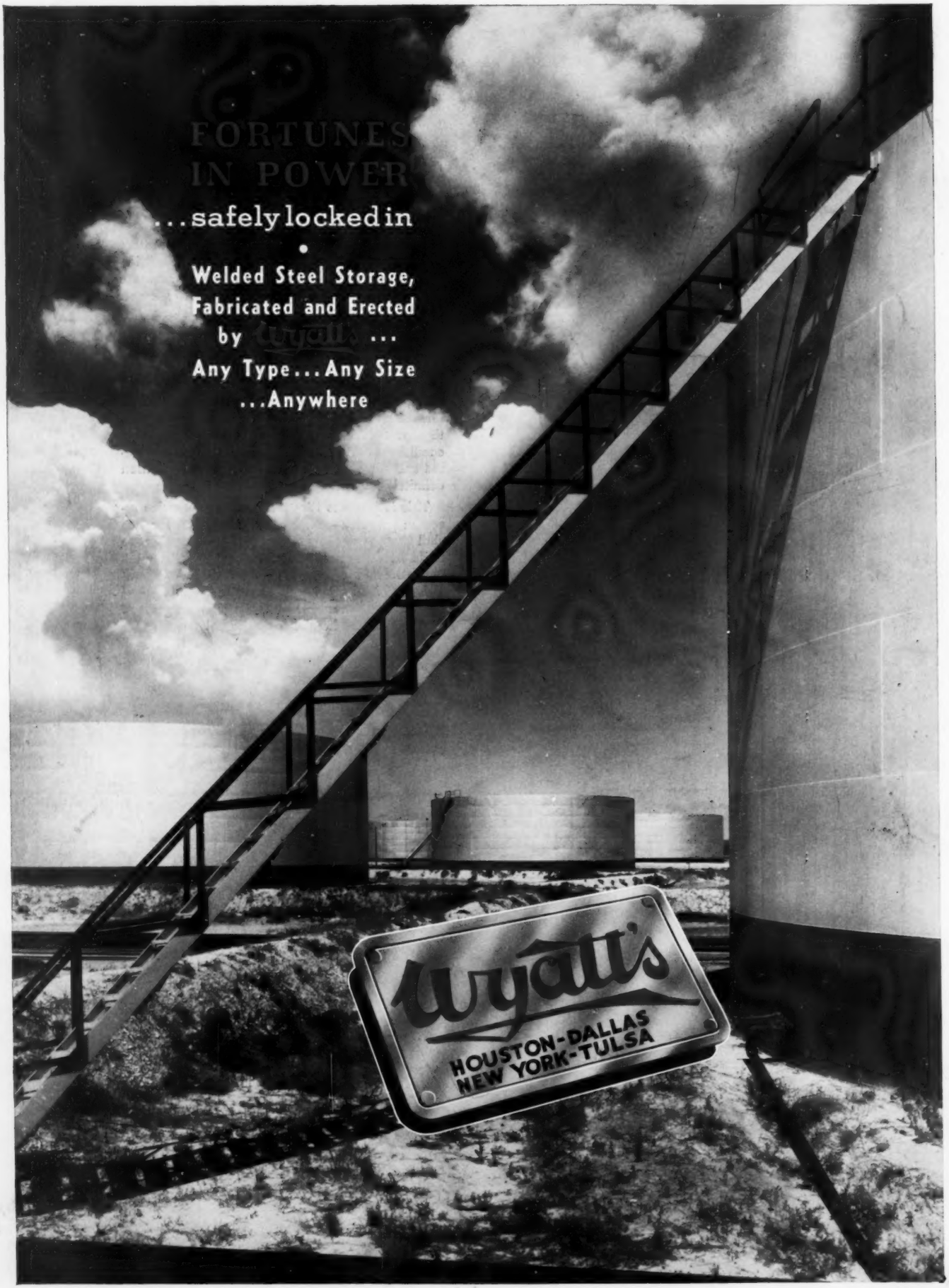
World Standard of the Industry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